ELECTRICAL REVIEW

[ILLUSTRATED.]

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"Vitrite" Holders for Incandescent Lamps.

Much ingenuity has been devoted to designing incandescent lamp holders, considerable advance having lately been made in small improvements in their electrical and mechanical parts. One of the greatest troubles, hitherto, has been in regard to the platinum loops of the lamps; these being more or less fragile are apt, especially in the hands of the inexperienced or careless, to be strained or broken when the lamps are being attached to, or detached from, the holder. The vitrite holder, a new invention, both with regard to material and design, does away with this trouble, there being no strain at all on the platinum connections, whilst the lamp, although held by the hand in fitting in or taking from its socket, can be manipulated with the greatest ease and safety by the most inexperienced person. Vitrite, it may be said, is a kind of glass, perfectly hard and incapable of fusion, except at very high temperatures. It is also unaffected by damp, sea-water, or even acids. In color it is jet black, and has a smooth, polished appearance. Its peculiar feature is that whilst a first-class insulating material, it admits of the necessary mechanical connections for the conduction of the current, being imbedded in it in process of casting. This very much reduces the cost, and in addition to lamp holders, renders it suitable for cut-outs, switches, and other electrical purposes.

Fig. 1 shows an incandescent lamp with the vitrite cap attached. The cap, *A*, which is secured to the bulb by a specially prepared cement, has imbedded on the top two metal contact pieces, *B*, pierced with holes through which pass the platinum wires connected with the carbon filament, and with which these wires make good electrical contact by means of a special amalgam.

Fig. 2 shows an illustration of the holder which consists of two main parts, the vitrite portion, *C*, shown also in Fig. 3, and the brass socket piece, *D*. In the portion, *C*, are imbedded two split terminals, *E*, which receive the leading in wires.

Fig. 4 shows the combination nut and piston spring, which being tightened down upon the wires within the split terminals completes the circuit when the vitrite cap in conjunction with the lamp is pressed in the holder. The brass socket, *D*, is attached to *C*, so that it is easily removable. The slots, *F*, in the socket by which the lamp is held, are adapted to serve, if so required, as a switch—turning the lamp to right or to left, turning it off or on. The holder generally is neat and finished in appearance, as may be seen from Fig. 5, and being readily adapted to existing installations can be recommended as a valuable accessory to electrical work.

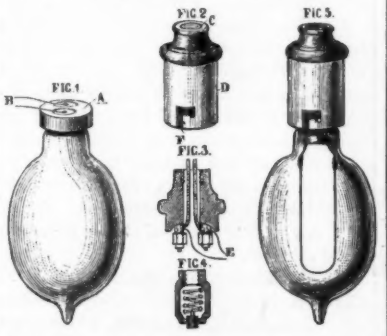
We may add that an improvement is now being effected in the socket so that in the manipulation of fitting, the bulb itself need not be touched, a small projecting collar of vitrite being attached to the socket for the purpose of handling.

The vitrite holders and other vitrite appliances are manufactured by the Vitrite Company, and can be obtained from Messrs. Woodhouse and Rawson's Supply Department, who will also cap any lamps of other makers.—*London Electrical Review.*

Notes on the Effects of Very Powerful Electric Currents.

Dr. G. F. De Schweinitz thus writes in the *Therapeutic Gazette*, January 15, 1885:

The following report is intended to briefly place upon record the history and symptoms of two men who were prostrated by excessive charges of electricity, received from the apparatus at present in vogue for electrical illumination by means of the arc light. The first case occurred in a man aged about twenty-four years, who was admitted to



VITRITE HOLDERS FOR INCANDESCENT LAMPS.

Prof. H. C. Wood's wards, in the University Hospital, shortly after the accident, which happened as follows: This workman was walking through one of the departments of a large car manufactory in this city, carrying over his shoulder a long iron bar, which also rested lightly against the side of his head. The upper end of this implement became entangled in the wires connecting the dynamo with the carbons, thus placing the man within the circuit, when, to use the expression of his comrades who witnessed the result, he was felled to the ground "as if struck by lightning." His fellow-workmen hurried to his assistance, found him entirely unconscious, and, having conveyed him to a neighboring room, sent a request for his admission to the hospital. When the reporter of these notes arrived, about a half an hour after the accident, he found the patient perfectly insensible and oblivious to all external impressions, face and skin surface natural, pupil normal and sensitive, pulse full, and rather slow, respirations somewhat labored, rather deep and the rate below normal, being ten or twelve per minute. The coma, pulse, respiration, were not unlike the beginning of the second stage of opium narcosis. No attempt at restoration was immediately made, but he was conveyed to the hospital and taken in charge by Dr. W. W. Jaggard, the then medical interne of that institution. After being sharply shaken and shouted at a few times, he slowly open his eyes, his face assumed a bewildered expression, and he answered questions in a dazed sort of a manner. His temperature was normal, his pulse, perhaps, a little more rapid; his respiration, when he remained quiet, was slow. He complained of no pain, but only of a certain amount of disability in the motions of the right arm and leg. After drinking a cup of milk he fell into a quiet sleep, from which he did not awake until the following morning, the time being then a little after midnight. In the morning no evil effects from his accident were noted, except some muscular disability of the right side. He asked for his discharge, which was granted, and he passed from observation.

The second case also came under the notice of the reporter, and occurred during August of this summer in the large Bessemer works in a neighboring town. This mill is illuminated with Weston's duplex lamp, the dynamos being of the same make, five dynamos to fifty lights. A description of the accident cannot, perhaps, be more accurately given than in the words of the gentleman who experienced it:

"On a wet, rainy night, in an open shed, I received a slight shock when using one hand, protected by a cotton handkerchief, in adjusting the lamp. I received the final shock in trying to remove the lower carbon, using both hands again, supposed to be insulated by a double wrapping of cotton handkerchief, the one hand holding the carbon, and the other slacking off the adjusting set-screw. Now for my sensations: It seemed to me as if there was an instantaneous bright flash, which may have been due to the sudden change from light to so absolute a darkness that it appeared to have body. The next sensation, after appreciating this inky darkness, was that of trying to tear myself away from something that held a terrible grip upon me. My hands seemed to hold on while my body was trying to get away, every nerve and muscle being strained to its utmost. My next impression was, when I opened my eyes and found I was lying upon my back, perfectly straight, but in exactly the opposite position to the one assumed when I was standing, showing that I had been completely turned around. One carbon was found about ten feet away from my one side and the socket which holds the lower carbon about the same distance away from my other side. This I had torn out of the lamp. Above me the lamp was swinging violently. The whole time from the moment the current struck me until I picked myself up was less than three minutes."

When seen, this gentleman complained of no evil after-effects, except a great feeling of muscular soreness, produced, no doubt, in part by the number of bruises and brush burns which covered his thigh and back, showing how violently he had been thrown upon the ground.

Primary Batteries.

Mr. Stanley Currie has sent the following to the *London Electrical Review* respecting this battery: "I notice some of your correspondents are making inquiries with regard to the Lalande-Spence oxide of copper primary battery. I have been using one of the batteries constantly for a considerable time for intermittent work, and for the last two months have been experimenting with a great number of cells of different forms and sizes for the Standard Electric Light Company, who hold the patents for England. The form of cell hitherto used has been the horizontal or tray form. The working E.M.F. of these cells is, as you have correctly stated, about .6 volt. The company are now, however, adopting a vertical form of cell, which is for many reasons greatly superior. These cells have a slightly higher working E.M.F. of about .7 volt. They are now being made in two sizes, one giving 10,000 ampere hours with a steady output of thirty amperes, and a smaller size giving 1,400 ampere hours at output of 10 amperes. A great feature of the battery is the fact of there being practically no action in open circuit. Thus the larger cells would maintain 30 amperes for 330 hours, and the smaller ones 10 amperes 140 hours. The work can be spread over a period of months if necessary. I have had a battery of the horizontal form of cell in constant use for intermittent work since August last. It was recharged once in December, and gives me 40 volts and 6 amperes as constantly as could be desired. In reply to your correspondent, Mr. Browne, I should recommend, as he requires so small a current, his using 17 of the horizontal form of cell, which give a steady output of 3 amperes. These cells hold about 400 ampere hours, and thus, at the rate of 2.5 amperes, should run for 150 hours, which at five hours a day would last 30 days. The internal resistance of the cells is very low, that of the large form being about .005 ohm, and the small one .02 ohm. The battery giving off no smell or noxious fumes is a great point in its favor. I often spend many hours a day in a room where there are over 200 cells, and have suffered no inconvenience whatever. I shall be very glad to give any further particulars I can."

The Lalande-Chaperon Battery.

It appears that the oxide of copper battery of Messrs. de Lalande and Chaperon is beginning to be appreciated in France. We (*Bulletin International des Telephones*) have been informed that 40 spiral cells of that system have recently been set up in the Paris central telegraph office in the place of 200 Callaud cells. At a meeting of the old students of the Arts and Trades Schools, held at Rue Vivienne on the 31st ultimo, they were able to satisfy themselves of the advantages which the new battery of Messrs Buchin, Tricoche & Co. possesses for electric lighting as well as for telephoning purposes. The room where the meeting was held was illuminated by three incandescent lamps, one of A. Gerard and the other two of Swan. The lamps were in perfect action during the whole evening. The Gerard lamp, of 35 volts and 3.5 amperes, was lighted by two batteries of 25 cells, No. 2 pattern, filled with bichromate of potash and joined in parallel. The intensity of the light exceeded 50 candle-power. The Swan lamps, of 12 volts, were each worked by 10 bichromate of potash cells, No. 2 pattern. Telephonic communication was also established in the hall, the battery consisting of four bisulphate of soda cells, No. 1 pattern; the circuit was closed all the time, and although the battery was incessantly in action for four hours, the telephonic communication was at the conclusion of the meeting as clear and perfect as at its commencement. The above-mentioned experiments, says the *Bulletin*, show that Messrs. Buchin and Tricoche may, with good reason, call their battery the "non-polarizable."

—— Oshkosh, Wis., have tired of gas and the moon, and have just made all the necessary arrangements for the electric light.

The Annual Report of the Commissioner of Patents.

The *Official Gazette* of February 10 contains this report in full, from which it seems that during the year 1884, 40,710 applications for patents, caveats, etc., were filed. The total receipts of the office for the year were $1,075,798.80. The total expenses were $970,679.76, leaving the excess of receipts over expenditures $105,219.04. The patent fund has now a balance in the treasury of the United States of $2,781,695.28. Patents issued to citizens of the United States, 19,013; patents issued to citizens of foreign countries, 1,284. The commissioner notes that the facilities for conducting the business of the Patent Office have been extended during the present year by the addition of nine rooms, which is about one-fifth of the number needed for the proper conduct of the business of the bureau. The rooms vacated were filthy and constantly foul. Several deaths have occurred by reason of disease contracted in these foul, damp rooms. The commissioner again calls attention to the insufficiency of facili ies for conducting examination; no suitable laboratory is provided; it would be entirely practicable to build a basement room or cellar in the center of the court of the Patent Office building, and provide all these needed appliances, and the Patent Office has funds in the United States Treasury with which to defray the expenses, and he again urges that a sufficient sum be appropriated for this laboratory, etc

The commissioner again urges his recommendation of last year to Congress, that the present force of examiners be largely increased, for they are inadequate beyond all question; that those people who have business with the Patent Office have paid to the Government ample funds to provide everything essential for promptness and dispatch in its business, and he respectfully submits that it would be difficult to find a satisfactory reason for withholding the fund from the use for which the Government received it.

The commissioner makes another very candid statement, which is as follows: "I am urged every day, by gentlemen of both Houses of Congress, to make cases special on the ground that irreparable loss will result from the delay incident to having cases take their turn, and am very severely criticised, and not infrequently condemned, because I refuse to violate the plain provisions of the rule which prohibits me from complying with such requests. It is true that many important interests are lost or greatly damaged by reason of the inability of inventors to have their applications disposed of within a reasonable time. Since there is no lack of revenue, as hereinbefore shown, to provide every needed facility and adequate force, there is just cause for complaint that in many instances inventions are lost or their value impaired by the delays which could easily be avoided, if the funds paid by inventors in the shape of fees were applied to the purpose for which they are received by the Government,"

The commissioner recommends an increase of the clerical force of fifty-one, and states that during the past year a number of most efficient examiners have resigned because of the inadequacy of salaries paid. "As before stated, a high order of ability, a high order of attainment and the strictest integrity are required in this service."

Here are some points which are quite essential to hundreds of our readers. The commissioner of patents states plainly that a high order of ability and attainments are required and especially strict integrity. Is it an advantage to have senators and representatives of the United States' Congress approach the commissioner of patents to ask him to violate one of the most essential of all the requisites connected with the Patent Office in order to give preference to some of their political friends or favorites; and is it exactly an honorable transaction for the United States Government to receive from an inventor the full amount of money which the Government demands, and then to put that amount of money into the treasury and to allow employes of the Patent Office to work in rooms which are foul and filthy, and where green mould and constant decay are going on, until the employes sicken and die from this kind of Government treatment? If the senators and representatives who are so largely dependent in their business ventures upon the inventive skill and mechanical ability of the class of men who are mainly inventors, would pay as much attention to the proper solution of the Patent Office question, which is a disgrace to the country, as they do to obtaining positions or attempting to subvert the real functions of the commissioner of patents, the mismanagement of the Patent Office (outside of its commissioner) would no longer be a disgrace to those who control it. We have heard very little fault indeed found with Mr. Butterworth, but it seems that he cannot obtain either the room or the assistance required to make a proper disposal of the business put into his hands, for which the Government gets the money in advance and then piles it up in the treasury, telling the inventor practically to wait six months or a year. To say the least, it is a very curious state of affairs, and one which does not reflect any great credit upon those who should see that such things do not occur.

Wonders of Electricity.

The possible applications of the principle of the electrical transmission of power are almost numberless We shall, I believe, at no distant date, have great central stations, possibly situated at the bottom of coal pits, where enormous steam engines will drive many electric machines. We shall have wires laid along every street, the electricity tapped into every house, and the quantity of electricity used in each house registered as gas is at present. The storage battery will fill a place corresponding to the gasometer in the gas system, making the current steady, rendering the consumer independent of the irregular action or stoppages of the dynamos of the central station, and enabling the use of dynamos of the highest tension, *i. e.*, those which produce the currents of the greatest intensity. The electricity will be passed through little electric machines to drive machinery, to produce ventilation, to replace stoves, and to work all sorts of apparatus, as well as to give everybody an electric light. Solar heat will be used to run the dynamos in the cloudless regions. Everywhere the powers of the tides and such waterfalls as Niagara are to be utilized. Is not a millennium to be anticipated when the water power of a country shall be available at every door?

Steam, which in the last century, has conferred so many benefits on the world, will give way before electricity. The dynamo will replace the steam engine. This prediction seems wild and visionary, yet when steam was first thought of as an available force its advocates were considered, just as the advocates of dynamical electricity to-day are considered, mere enthusiasts. But public opinion never stops the march of intellect. After it had proved the powers of steam to be enormous, genius never halted, but straightway went on anticipating still more wonderful discoveries in the realms of electricity.

The prophetic ken of science was happily exhibited by Dr. Lardner in his treatise on the steam engine. "Philosophy," said he, half a century ago, "already directs her fingers at sources of inexhaustible power in the phenomena of electricity and magnetism, and many causes combine to justify the expectation that we are on the eve of mechanical discoveries still greater than any which have yet appeared; and that the steam engine itself, with the gigantic powers conferred upon it by the immortal Watt, will dwindle into insignificance in comparison with the hidden powers of nature still to be revealed, and that the day will come when that machine which is now extending the blessings of civilization to the most remote skirts of the globe will cease to have existence, except in the page of history."

To-day we are beginning to appreciate the truth of this prophecy. To-day we see dynamical electricity in the forefront of the physical sciences. The principle of the transmission of power by electricity fast approaches its realization. We are, in truth, just entering upon a wonderful age.—*Robert Luce in Van Nostrand's Magazine.*

The Chambers' Lightning Rod.

Editors of the Electrical Review:

SIR:—In your number for January 3d, you did me the honor to reprint a short paper of mine from the proceedings of the Davenport Academy of Sciences, on the Chambers' Lightning Rod. In your issue for January 24th I find a letter from Mr. J. C. Chambers, referring to that paper.

In that letter Mr. Chambers says that the principle on which I explained the action of the rod, is not that on which he bases its efficiency. I considered it a conductor forming a communication between two waves of air, one positively and the other negatively electrified, and that through this conductor the tension of both is neutralized by mutual discharge. The details may be found in my paper.

Mr. Chambers maintains that his lightning rod is an insulated conductor electrified solely by induction caused by the over-passage of a strongly charged mass of air or cloud. This is the difference between us.

There is no occasion to discuss at any length Mr. Chambers' remarks about the effect of points, and about induction They express elementary facts on which electricians fully agree. His numerous extracts from Faraday, Silliman and Jenkin are sufficient evidence of this But there will not, I think, be the same consent in regard to the application of these facts.

I will not here enter on the whole subject, but will limit myself to the single point brought forward by Mr. Chambers. My purpose is not solely or chiefly to raise an objection to his use of the facts of induction, but to ascertain what is truly the mode of action of the rod in question. Our knowledge of the branch of electrical science to which this subject belongs is so crude that any contribution of truth is exceedingly valuable.

In considering the theory which Mr. Chambers puts forth, and on which he bases the action of his lightning rod, a very serious difficulty in the way of its acceptance has arisen in my mind. I should premise that in writing what follows I am treating the question from Mr. Chambers' standpoint without committing myself to its adoption or rejection.

Mr. Chambers says: "The rod is so constructed that by the inductive action of the cloud an intense negative charge is evoked on the upper part, and an equally intense positive charge upon the lower, confronting the negative charge (developed in the same way) upon the roof of the building or highest point. The point or upper part will act by hurling up negatively electrified air or vapor so as to neutralize the positive in the air or vapor above and the lower part of the apparatus by hurling down positively electrified air or vapor, so as to neutralize the negative charge on the roof or highest point of the structure."

Now in considering this statement it appears to me that the lower side of the rod with its "equally intense positive charge" must be as dangerous to the building as the cloud from which it is to be protected. If a flash is liable to pass from the charged air to an inductively electrified house with dangerous consequences it must be as likely to pass from a powerfully excited rod insulated above the roof, for such a rod is in fact an artificial charge inserted between the natural charge and its striking point.

Mr. Chambers says afterwards: "The rod prevents the opposite pole from being developed upon the building," but if I understand this aright, it is consistent neither with the words previously quoted, nor with the law of statical electricity, according to which a charged body always develops by induction the opposite polar tension on all bodies within its "reach."

In this connection I should like to call Mr. Chambers' attention to the following experiment: The end of a horizontal cylinder insulated on a glass stand is adjusted to a jet of gas issuing from a burner. If an excited glass rod, or better still the conductor of a machine, be brought suddenly near the other end of the cylinder, a spark will pass between the brass burner, and the cylinder and the gas will be lighted. Having extinguished the flame, quickly withdraw the excited tube or conductor, and the gas will be again ignited. This experiment clearly illustrates the electrical conditions to which I allude. The excited tube is the cloud, the gas burner is the house, and the cylinder the lightning rod. The only difference is the absence of points on the cylinder. The addition of these if directed *toward* the tube has no effect on the spark *from the cylinder to the burner* as may be shown by making the experiment. In fact on Mr. Chambers' theory the rod is precisely in the condition and position of the prime conductor of an electrical machine. The points face the positively excited glass and from them the negative electricity passes off, while the conductor gives a stronger positive spark than can be obtained from the machine itself.

It was the consideration of these facts that led Faraday to utter a warning against putting an iron roof on a powder magazine. Such a roof might have electricity induced in it by the electricity of a passing cloud, and a spark might pass from its lower side to the earth.

I do not see, therefore, that by adopting Mr. Chambers' theory we can attribute any greater protective power to the rod than on the theory that it acts by conduction.

I should like to know if this question has ever been brought to the test of experiment? Has Mr. Chambers ever examined the electrical condition of one of his rods during the passage of a thunder cloud? If not, perhaps he will allow me to suggest that by doing so, with due precaution to secure accuracy and safety, he would settle the question for ever, and confer no small advantage on the science of statical electricity.

Space forbids any consideration here of the relative safety conferred by the rod on the two theories of its action. I have already exceeded the limit I assigned myself at the outset. E. W. CLAYPOLE.

Buchtel College, Akron, O.

Magnets of Hard Steel.

Bars of *file-tempered* steel may be strongly magnetized by the following method, and great permanency secured:

An old file, for example, is placed in a coil of moderate sized wire, with one end resting against a block of iron; one of the wires from a dynamo is connected to one end of the coil wire; to the other end of the coil wire is attached a small block of iron, which rests against the free end of the file; the other wire from the dynamo is attached to a good sized hammer, the face of which is past injury by the spark. It is clear that when the block, to which is attached the coil wire, is struck by the hammer against the end of the file, it gives it a mechanical shock, while at the same instant the current passes through the coil, which, being instantaneous, will not injure it, even though very powerful.

By this plan of combined mechanical and electrical shock, the molecules of the hard steel are jarred into position.

WM. B. COOPER.

Philadelphia, March 9, 1885.

* * A singular effect of the electric discharge has been noted by E. Villari. Strong thick glass plates are easily broken by the spark from a Leyden battery if they are silvered only on one side. The same physicist believes that the ramifications observed in the dust figures of electric condensers are due to partial internal discharges. In making microscopic researches on the traces of electric sparks engraved on glass, he has observed that these sparks vary with the glass, not with the nature of the electrodes; that they are not removed by acids, and that they are probably caused by heat. Tinted zones are produced on the surface of the glass where these sparks have passed. The cross section of the spark is, for a constant potential, proportional to the charge which produces it.

Electric Lighting in San Jose, California.

L'Electricite notes that, while the introduction of the electric light for the illumination of public streets and public buildings has progressed very slowly in France, and even seems in a measure to have been abandoned there, all other countries are, to a very great extent, using on their streets such systems as offer the greatest advantages. The fact seems to be that electric lighting is crippled in France by the concessions which have been granted to the gas companies, giving them a monopoly of lighting. The illustration, which we give, borrowed from *L'Electricite*, shows the disposition adopted in San Jose, California. This city was formerly lighted with gas, but, as will be seen, electricity has superseded it.

The first tower erected in San Jose, which our illustration represents, is a pyramid, the uprights and braces being made of gas pipe, and stands at the intersection of Santa Clara and Market Streets. The pyramid measures about 90 feet square at the base, at the summit about four feet. The entire height is about 210 feet. At the top, over the light, is a large circular plate, which acts as a reflector. The two have six Brush lights, and the effect is to light the streets in the vicinity with a soft, mellow light, not unlike moonlight.

So well satisfied were the people of San Jose with the results obtained from this first tower that a number of others have since been set up, and the city now relies upon them exclusively for street lighting.

A Modification of the Bunsen Cell.

The great objection to the use of the Bunsen cell is, of course, the noxious fumes which it gives off. M. Rodolphe Handmann has conducted numerous experiments with the purpose of finding some liquid, or mixture of liquids and salts, which would do away with these fumes, and at the same time advantageously displace the nitric acid. Chromic acid has been employed for some time, but it has not proved quite successful, owing to the formation of insoluble crystals in the pores of the carbon and on its surface. After numerous unsuccessful experiments, M. Handmann has at length succeeded in finding a depolarizing liquid of the following composition:

2 decaliters of sulphuric acid.
25 to 50 decaliters of bichromate of potash.
1 decaliter of nitric acid.
2 decaliters of water.

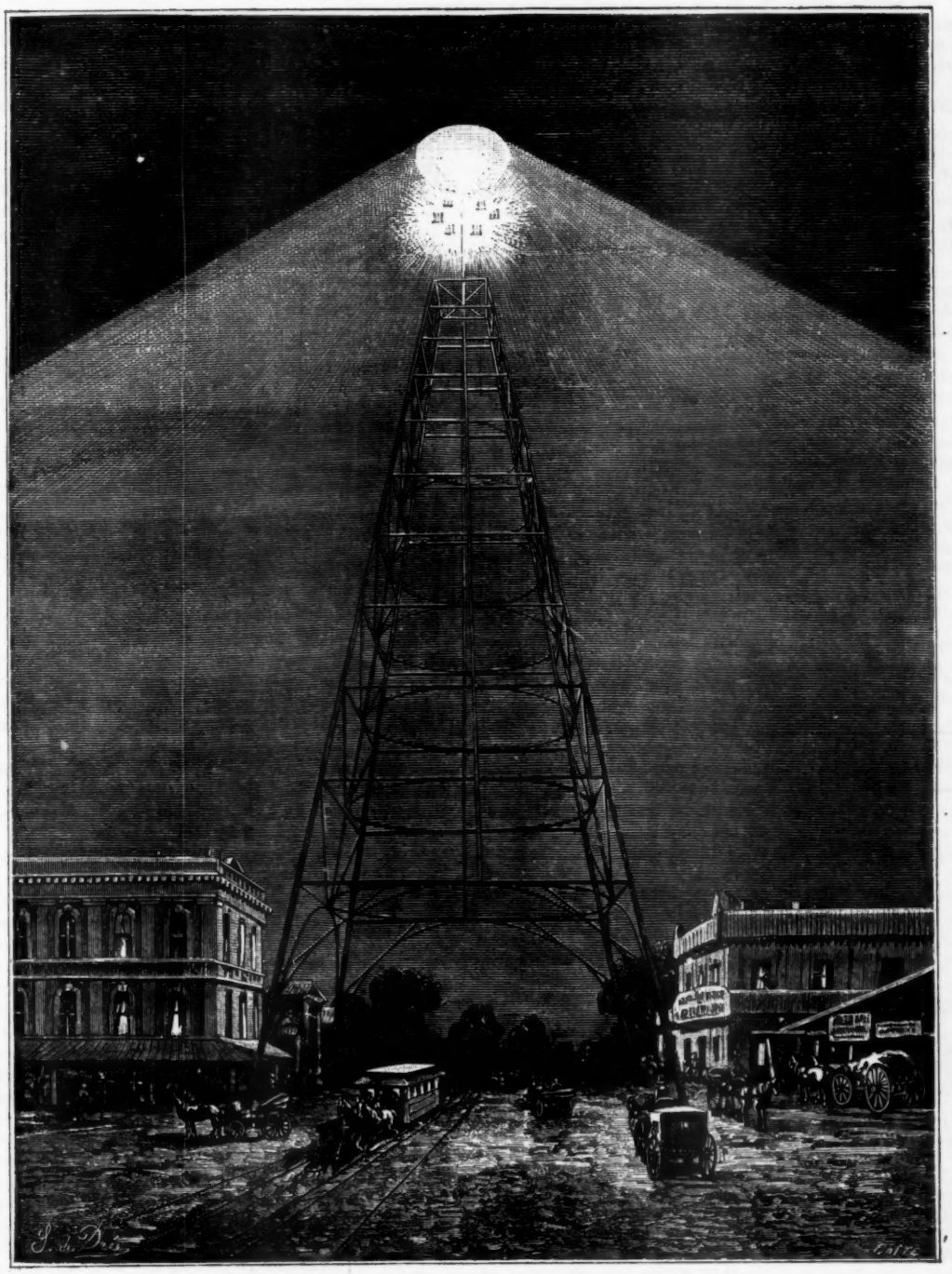
The noxious fumes are completely banished by the use of the bichromate of potash, and the cell, with an electromotive force slightly less than that of the ordinary Bunsen, acquires a remarkable constancy.

A cell of this composition, where the bichromate entered in the proportion of 25 grammes, was placed in a closed circuit for 17 hours, the resistance of the exterior circuit being equal to the internal resistance of the cell, and at the end of the 17 hours it gave a current 87 per cent. of the strength of the original current.

In another experiment, where the proportion of the bichromate was 50 grammes, it was 20 hours before the current fell to 87 per cent. of the original current.

The business of the Western Electric Company, of this city, has been fully up to the average, and in their department for the manufacture of electric bells, annunciators, burglar alarms and electric gas lighting they have been very busy, as may be seen from the following list of buildings in which they have recently put in the above apparatus: Central Park apartment houses, Third Avenue and 58th and 59th Streets; Manhattan and Merchants' National Bank building, Wall Street; C. L. Tiffany, two houses, 72d Street and Madison Avenue; Union Theological Seminary, Park Avenue, 69th and 70th Streets; W. L. Skidmore, two houses, 67th Street and Madison Avenue; Henry Villard's new house, 50th Street and Madison Avenue; Lincoln National Bank and Safe Deposit Company, 42d Street and Vanderbilt Avenue; Mr. Johnson, President Edison Company, East 36th Street; H. McK. Twombly's new house, 54th Street and Fifth Avenue; W. S. Webb's new house, 54th Street and Fifth Avenue; Adolph Keeb's new house, Fifth Avenue, near 80th Street; A. M. Hoyt's new house, Fifth Avenue and 74th Street; Mr. Schiff's new house, Fifth Avenue and 74th Street; Charles Fiske's new house, 2,065 Fifth Avenue; A. H. Holmes' new house, Madison Avenue and 50th Street; E. D. Adams' new house, Madison Avenue and 51st Street; Mr. Kennedy's house, 6 West 57th Street; Lloyd Phœnix, house, 21 East 33d Street; James Gordon Bennett's house, 128 West 21st Street; three houses for Norcross Brothers, East 70th Street; Mendelssohn Glee Club and Studio Building, West 55th Street; New York Cancer Hospital, 106th Street and Eighth Avenue; new steel cruisers Boston and Chicago; steamboats Providence and Bristol. The contract for the Central Park apartment houses is, without doubt, one of, if not the, largest ever given out for electric bell-work. Out-of-town work: Summer residences of C. F. Osborne, at Mamaroneck, on the Sound; J. J. McCoomb, Dobbs' Ferry, N. Y.; Mr. C. H. Mallory, Greenwich; John Roach, at Rye, N. Y.; Mr. F. W. Senff, at New Windsor, N. Y.; and also the steam yachts of Jay Gould, W. W. Astor and Mr. Gerry.

—— The Van Depoele Electric Light Company, of Chicago, are putting in a plant at Flint, Mich., using Mr. Bowen's tower system.



THE TOWER SYSTEM OF ELECTRIC LIGTING AT SAN JOSE, CAL.

* * The problem which confronts the steel rail manufacturers of this country, that of obtaining a market for their product, is one which will have a great influence upon the iron trade, and through that industry many others dependent upon it for support. The *Iron Age* in a recent article called attention to the production and consumption of rails in this country, in connection with the probable amount needed every year for building new roads and repairing or renewing old ones. The following table shows the increase per year of mileage, total consumption, and the amount in tons used for new roads and renewals of old ones:

	Inc. of mileage.	*Total consumption.*	*New roads.*	*Renewals.*
1867.....	2,449	627,157	279,200	347,957
1868.....	2,979	756,795	339,600	417,195
1869.....	4,615	906,749	504,000	402,749
1870.....	6,070	1,019,153	663,000	356,153
1871.....	7,379	1,341,434	814,800	526,634
1872.....	5,878	1,530,850	648,900	881,950
1873.....	4,107	1,148,849	453,400	695,449
1874.....	2,105	837,724	234,900	602,824
1875.....	1,712	810,770	191,000	619,770
1876.....	2,712	879,916	302,600	577,316
1877.....	2,281	764,744	257,300	507,444
1878.....	2,687	882,695	303,000	579,695
1879.....	4,721	1,157,420	532,500	624,920
1880.....	7,174	1,752,526	817,800	934,726
1881.....	9,789	2,230,421	1,116,000	1,114,421
1882.....	11,591	1,912,921	1,321,000	591,921
1883.....	6,755	1,399,671	770,100	629,571
1884.....	3,800	1,120,000	434,200	685,800

This table shows what a large amount is used yearly for renewals as compared with that used in building new roads. From the conclusions reached by the *Iron Age* it is stated that the total amount of rails which will be needed each year is about 600,000 tons. If the railroad building in this country continues at the rate of 4,000 miles per year, the orders from this source, it is stated, will not reach as high as those dependent upon renewals. The consequence would be that the capacity of the rail mills would be larger than the demand, and, according to the *Iron Age*, the outlook for rail manufacturers under those conditions does not seem to be very encouraging. The advisability of obtaining a footing in foreign markets would seem to recommend itself forcibly to the steel rail manufacturers of the United States.

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* * In a recent lecture at the London Institution on modern views of electricity Professor Lodge, of University College, Liverpool, observed that it had often been said that we did not know what electricity was, and that was still largely true, though not so true as it was twenty years ago. The modern views of electricity were due largely to Michael Faraday and Clark Maxwell, and it had been demonstrated that it was a fluid. The theory of action at a distance was, however, being gradually discarded, and it was now all but universally held that there was no action at a distance. Electricity was an incompressible fluid, which permeated everything, but of the existence of which we had hitherto been in much the same position as our ancestors in regard to the atmosphere. It should be borne in mind that we did not manufacture electricity, but that we only moved it about from one place to another, and that, as was the case with the atmosphere, directly it was moved from one place that which was taken away was replaced.

The Ball Machine.

Professor Silvanus Thompson evidently dislikes the subject of this machine, and states that its construction, at least from one point of view, is defective. At all events the machine works as well as any with which we are acquainted, and we would ask if certain advantages possessed by this dynamo do not more than counterbalance the defect to which Mr. Thompson refers. With a given amount of wire spread over two armatures instead of one, the pole-pieces are brought proportionately closer to the iron rings of the armatures, and double the cooling surface is presented by the wire. Are not these advantages which, however slight, may fairly be taken as a set-off against the absence of a second pole-piece, which the inventor himself would readily admit had no real meaning to him at the time it was first taken away, but which his results have shown there is actually no necessity for.

ELECTRICAL REVIEW
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NEW YORK, MARCH 21, 1885.

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There are 400 telegraph operators employed by the Western Union in Chicago—about 320 of these at the main office. The large operating room presents a very busy scene, and, outside of New York, is the most extensive in the United States.

The palace of the Elysee, in Paris, was lighted by incandescent lights on the occasion of a recent reception given by President Grevy, and the effect is said to have been very fine; but the journal in which we find the fact recorded, evidently regretting the lavish days of the empire, says that the government is so parsimonious in its allowance to the President for entertainment, that he could not afford to have as many lights as were really necessary to produce the proper effect. This is one effect of "republican simplicity," which those who assisted the second empire to fall evidently did not count upon.

One of the remonstrants, who appeared at the State House in Boston to oppose the increase of the Bell Company's capital stock, said that the property of the Bell Company was worth $42,000,000, and that, *therefore*, its capital should not be increased. If anybody can tell us where or why the "therefore" comes in, we should be greatly pleased to be informed. It is but due to the Bell Company to say that what is proposed is not in any way a *watering* of its stock. Much that has been said at the hearing, and much of the adverse outside comment, would lead to that belief. Under Massachusetts law every share of new stock put out must represent its value in cash paid into the treasury, and it is very certain that no special act which the Legislature would pass in this case would offer any exception to this rule.

The war rumors have put many an electrician on the *qui vive*. There are many devices in which electricity plays an important part, which would, their inventor's believe, prove invaluable in warfare, but the trouble is that wars on a large scale come so seldom, and, when they do come, are so soon over, that the inventors hardly get a chance to show what they have got before the smoke of battle clears away to give place to the white wings of peace. But, if—what is hardly probable—Great Britain and Russia, the Lion and the Bear, get at it in good, sober earnest, on land and on sea, and some of the other powers are drawn into the trouble, the "boys" will have a chance, and, in all probability, a good one, for both nations have money, and neither spares it when it has armies in the field. Should it be declared, we shall expect to see no end of death-dealing contrivances, which have been hibernating for years, come forth to claim recognition. It is very certain that, in the event of it being desirable to explode a mine under a fort, something better than a slow-burning fuse, such as at St. Petersburg, by going out once or twice, caused a fatal delay, would now be used. A couple of wires, a detonator, and a hand-generater would do the business infallibly and at the exact moment required. Let us hope that "grim-visaged war" is not to show his "wrinkled front" at all; but, should he, electricity will play a more important part than ever before.

Very slowly, it is true, but not the less surely, as we believe, the question of the successful transmission of power by electricity, as a commercial enterprise, is being solved. It has at last, fortunately, been brought to the only test which can determine and overcome the practical difficulties in the way, the test of actual commercial use. As yet, of course, this is on a small scale, but, if mistakes have got to be made in order to get at the true method, it is better that they should be made upon a small scale than upon a large one. It is objected that in such transmission of power, a large amount is loss, the loss varying from 25 to 50 per cent. Admitting this, and taking it as a factor in the problem, the simple question is whether such a loss can be afforded. For large operations, no. For small operations, yes. Where it is desirable to run a reasonably small number of light machines, say sewing machines, or small presses, or light lathes, and where it is at the same time undesirable or impossible to put in steam, which could not at best be done without large expenditure, without cutting up the building and without increasing insurance rates very materially, the convenience which comes from being able to have power, by simply bringing in two wires, without any cost for "plant," does, in many cases, outweigh even a loss of fifty per cent. of power. Then, again, in the case of lighting companies, it is something to them to have work for their engines and dynamos during the day-time, when their lights are not burning, and they can afford in this waste time, so to speak, to produce and sell power at a figure at which a company doing an exclusive power business could not afford to compete. The insurance consideration mentioned above is much more important than some might suppose. Much as has been said about "the dangers that environ" electric light wires, you will not find an insurance man who would not prefer a dozen of them to an engine and boiler, and all the contingencies connected with them. The work is going on, and ere long we expect to see electrical power regularly sold in all our large cities.

The antagonistic feeling which careful nursing by interested parties, and persistent misrepresentation has aroused in Massachusetts against the Bell Telephone Company is as unreasonable as it is phenomenal. What the Bell Company has actually done in Massachusetts, has been to give, through its licenses, excellent telephone service at a low price—that is the sum and substance of it. And yet, by howling the potent word, "monopoly," certain people inimical to the American Bell Company have succeeded in making very many fair-minded, honest, and apparently sensible people believe that the Company is in some way doing them and everybody else a personal injury, and ought therefore to be granted no legislation calculated to aid it in its work. The request of the Bell Company is simple and straight-forward. In order to enable it to construct a system of long lines, for long-distance telephoning, it asks for a very considerable increase in its capital, that is, for authority, to sell a new lot of stock, in order that the proceeds may be put into visible property which will do as much to facilitate intercourse between cities as the telephone, as now used, facilitates intercourse between different parts of the same city, or between cities and adjacent towns. What objection, other than a sentiment alone, can there be? If men stand ready to invest their money in such an enterprise, why should the Commonwealth of Massachusetts, or any considerable number of its citizens, object? If it were a scheme for "watering," so that the few could make money at the expense of the many out of the "deal," there might be plausible objection, but it is nothing of the sort, but simply a request for permission to sell stock to those who are ready and willing to invest their money in an enterprise which very long and costly experiments have proved feasible. The Bell Company, before asking this, built a double copper wire from Boston to New York, and experimented with it for a year. We have talked over this circuit, and found conversation as easy as between two offices a block apart. What such facilities for communication as this means to business men, it is not necessary to dwell upon. Compared with a *conversation*, even though brief, in which questions can be asked and answered, and explanations given, the sending of a telegram is as slow and unsatisfactory as is a stage coach when compared with an express train. Of course the execution of so vast an enterprise, whose purpose it is to cover the whole country with a network of copper wires covering the entire country, requires large sums of money. This, it seems, is ready and waiting. All that is asked by the American Bell Company is permission to take and use it. Why there should be so strong a feeling in Massachusetts against giving it this permission it is difficult to see, especially as everybody understands that if the company cannot accomplish its object in this way, it certainly will in some other.

There are many instances in which the electric light has an economic value which has no reference to or connection with its cost. The Panama Canal Company has, until recently, used dynamite in making its excavations, but experiment showed that better results could be obtained with powder, and it accordingly entered into negotiations with the owners of a powder mill near Rouen to furnish it a large amount regularly—about one hundred tons a week. This was nearly double the capacity of the mill, and, if the contract was to be taken, it seemed as though it would be necessary to double its size. But a better expedient was thought of. As is well known, powder mills work by daylight only, because, heretofore, there has been no artificial light that could safely be carried into or near them. But the firm in question fitted up their mill with Edison lights, putting them in recesses in the wall, with thick plate glass in front of them as an extra precaution; and now the mill works the whole twenty-four hours through, and has more than doubled its output. The cost of increasing its dimensions and adding to its machinery has been saved, and, by adding a new set of workmen, the desired product is obtained, with no more danger of explosion than when the work went on by daylight only. In this case the dynamos—located at some distance, as a measure of safety—are operated by gas engines, and the conductors which convey the current are specially insulated, so as to prevent all possibility of sparks. This is but one of many ways in which the electric light is doing service under circumstances that would preclude the possibility of using any other artificial illuminant known.

In a recent number of one of the foreign journals is an acccount of an incandescent light plant recently installed. The source of current is a bichromate battery of several cells, peculiarly constructed, and so contrived that the liquid is constantly renewed and changed. This battery acts continually, requiring, it is said, no attention oftener than once in two days, and supplies the current to a secondary or storage battery, which, in turn, operates two or three incandescent lamps of low resistance for four or five hours every evening As an experimental affair, such a plant may do very well, especially if the owner be an amateur electrician who likes to "putter." But, so far as any such scheme solving the question of house illumination without a dynamo, it hardly seems the thing. Even if the question of economy were left out of the question, as it may be when the desired result is looked upon as a luxury, there are altogether too many things liable to work unsatisfactorily, each of them absolutely essential to the satisfactory working of the whole. Primary batteries have a way of running down in an unaccountable manner; and as for storage batteries, their vagaries and actual vices are beyond human comprehension. We are still firm in the faith that somebody is yet going to devise an arrangement for the successful lighting of houses with batteries as a source of current, with reasonable economy, and with need of no more attendance than the same amount of light would require if given by kerosene lamps, for instance; but up to the present time this has not, to our knowledge, been attained, and we are quite convinced that the arrangement above described will not accomplish it. The conditions which the coming system must satisfy are: reasonable economy as to space and first cost, absolute safety, simplicity in attendance required, and the consumption of materials which can be replaced at a figure that will bring its use within the means of fairly well-to-do people. It is not expected that it can, at the start, be made available for the million, or even the hundred thousand. Produce a system that one family out of every hundred in the country can afford to use, and your fortune is made. If it be patentable, and the patent be capable of holding its own, it is worth as much as any patent ever issued by this or any other government. Is not the prize worth striving for, Messrs. Inventors?

A small electric motor, of high speed, has recently been shown to be an important aid to surgery in certain operations. It seems that, in some cases, it becomes desirable to quickly remove portions of bone, and to exemplify how it could be done, a sheep was taken, etherized, the bone of his leg was laid bare, and then, by means of an instrument driven by the motor at the rate of 1,200 revolutions per minute, a portion of the bone was bored out, and, in a very short time, the operation was over—a tiny incandescent light was used for examining the cavity as the work progressed—the wound was dressed, and the sheep was restored to conscious

ness and sent to the hospital to recover. The operation was watched with great interest by a large number of surgeons, who expressed their high appreciation of this new aid to their work. It seems that, when done in the old way, the removal of softened or diseased bone usually involves a shortening of the limb operated upon, but in this way it can be accomplished without any such result following, and recovery is much more rapid in consequence. It is believed that a similar motor can be advantageously used for driving a circular saw, which, in capital operations, will cut through the bone of a leg or an arm in a twinkling, and very materially shorten the time necessary. What with the electrical cautery, for the bloodless excision of tumors, and other aids which electricity has lent, as well as this later device, it certainly seems as though surgeons were under deep obligations to the mysterious fluid which is doing so much for mankind in so many varied ways, and of which, as yet, we know so little, comparatively.

In a recent statement, the Mayor of Chicago, "our own Carter," said that Chicago already had seven hundred miles of wire underground. This observation, printed in and commented upon by the Chicago papers, has been taken up by the eastern press, particularly in Boston and New York, and the changes have been rung upon it, *ad nauseam*. One newspaper writer, of a mathematical turn, has figured out the number of streets that this long stretch of wire would cover, and has satisfied himself that if seven hundred miles of wire can be put underground, all the wires in the city may be. Now let us look at the facts. Take the Boston exchange, as an example. Whenever this is arranged, it will have about twenty-five hundred wires radiating from it. These will be in cables—let us say, twenty-five of one hundred conductors each. Now, supposing they were all buried; it is altogether probable that they could be worked satisfactorily for a distance of half a mile each on the average. This would be twenty-five half miles of cable—say twelve and a half miles in all. As each would have one hundred wires, this would mean *twelve hundred and fifty miles* of buried wire, all within half a mile of the exchange. What would it amount to out of the whole length of wire in the city? What do the seven hundred miles of buried conductors amount to, out of the thousands of miles of wire strung overhead in Chicago? People talk as though the burying of seven hundred miles of wire in Chicago was an achievement which had solved the underground question. When the work which the Metropolitan Telephone Company in this city now has in hand is completed, it will have at least a thousand miles of wire under the surface, and yet the space thus freed from overhead wire is inappreciably small when marked out on the map of the city, although the expense has been serious, and the work is looked upon as experimental at best. The fact is that very few people appreciate how enormous is the length of wire which is in use in all our large cities. Besides the telegraph and telephone wires, there are miles upon miles of wire used for other electrical purposes, and their length and the number of their uses are increasing daily. When Chicago or any other city has put five or six *thousand* miles of wire underground, and reports that they are all working satisfactorily, it will be time to talk; but a paltry seven hundred is hardly enough to brag upon.

W. C. Dewey, formerly secretary and treasurer of the Palmer Wire Company, has recently purchased the banking and brokerage business established by F. W. Brown & Co. at 20 Congress Street, Boston, and is now dealing (as will be seen from an advertisement on another page) in bonds and securities of all kinds, as well as telephone and electric light stocks. Mr. Dewey has had considerable experience in the banking business, and is reliable and deserving of success.

It is stated that Edward G. Bowser, of Chicago, a real estate broker, has commenced suit against the Western Union Telegraph Company, claiming $50,000 damages. Last spring he offered a tract of land in Texas to a syndicate of capitalists in London for $55,000. The syndicate sent a telegram offering $52,000, but the telegraph company delivered the telegram to another man of the same name. Three months later the telegraph company discovered the mistake, and sent the message to the plaintiff, but too late.

In the Southern Telegraph case heard before Judge Boardman in the United States Court last Tuesday, the cases of Mahone and Lochrane *vs.* the Southern Telegraph Company, were consolidated, and the same receiver was appointed that had been appointed in Virginia. The decree requires him to give bonds for $50,000. Notice of all further motions and orders as well as all the dispositions of property in this jurisdiction is to be given to Judge Lochrane, who becomes by this consolidation co-plaintiff with Senator Mahone.

Our associate, Mr. William A. Hovey, is the author of an interesting volume entitled, "Mind-Reading and Beyond," compiled largely from the records of experiments conducted by the London Society for Psychical Research—a society made up of some of the foremost scientific men in England. These experiments, which were in great variety, go to show that in certain cases thoughts, words, numbers, etc., upon which one person strongly fixes his attention can be perceived and given by another, when every precaution that science can devise for preventing communication between the two has been applied. The conclusion is reached as the result, not of a few, but of many hundred experiments, and the results, as detailed in Mr. Hovey's book, are astonishing and interesting, and calculated to awaken many new trains of thought. The book, which is profusely illustrated, is published by Messrs. Lee & Shepard, of Boston, and may be had of all booksellers.

EDITORIAL NOTES FROM THE WEST.

Mr. D. H. Louderback, vice-president of the Central Union Telephone Company, favors the plan proposed by the REVIEW correspondent to issue tickets to non-subscribers desiring to occasionally use telephones, but thinks that to properly account for the many tickets that would be turned in would make life a burden to the secretary. Then there would be opportunity for deception in the use of the tickets at the 50 per. cent. discount, should any subscriber feel so inclined. All telephone men agree that some remedy should be devised to do away with the annoyance and hindrance of telephone deadheadism. It is not alone the company that will be benefited, but subscribers themselves will find it greatly to their advantage. If the instrument is used only by those entitled to do so, that provoking answer from the central office of "busy" would be reduced at least one-third. Important business has been delayed, if not diverted elsewhere, by a "friend" monopolizing the subscriber's telephone at a time when parties at other telephones were trying to communicate with him. The adoption of a plan by which the rental is in exact proportion to the number of messages will effectually remedy this telephone trouble, as well as many others.

Wm. Wiley Smith, general manager of the Missouri & Kansas Telephone Company, was in Chicago last week, arranging for the purchase of another multiple switchboard and more aerial cable for the Kansas City exchange. He will probably order the board with all the latest improvements. This will make Kansas City the most complete central office in the country for exhibiting the improvements constantly being made with the multiple board, the exchange using six boards of five styles, all multiple. The first boards of this kind that were manufactured went to three cities—London, Minneapolis, and Kansas City, two to the last-named place. Four additional boards will have been added, each one possessing some improvement over its predecessor, all differing from the first two. If you ask any of the cheerful little ladies operating which board she prefers, she never fails to answer, "The new one, because it is *new*."

The Colorado Telephone Company has about the best average rental for subscribers of any of the companies. Now, if the expenses are not proportionately high, the stockholders of this company should be happy.

Chicago is quite an electric light shop. It is not, however, the best place for displaying electric lighting (although there is some very fine interior work there), as electric light people generally know. Chicago seems to fear the "monster bringing death," as Mayor Harrison said to the recent convention. This does not retard the work of the electricians. The Sperry, the Bain, and the Van Depoele systems (named after the electrician in each instance) have their works here, and while still studying and experimenting, have some very good plants and results generally to show. Mr. Foree Bain has some excellent ideas of the "points" to be handled in electric lighting, and will be heard from. Mr. Van Depoele is an indefatigable worker and delver, and his views were given the closest attention during the recent convention. He is furnishing the electric motor to be tried in Kansas City, soon, on the street railway. Mr. Sperry is probably the youngest of the Chicago electricians, is one of the brightest, and is as full of enterprise and resources as he is of electricity.

Somebody out West has knocked down the persimmon, and calls it the "induction suppressor." Another name suggested by a former showman now in the telephone business is "extra-territorial conversation facilitator." However, with long or short name, this is reported coming into court to win.

The late convention is looked upon as quite a success by the electric light people of Chicago and the West. It was what they had long desired, yet had not thought of the way to secure it until the REVIEW pointed it out. The efforts against it, because some of the parent companies, laboring under a misapprehension, failed to view it favorably at first, proved futile, and its opponents finding their efforts to kill or postpone it of no avail, made hot haste to reach Chicago, when telegraphed the size and weight of the gathering. An electrician of Chicago stated that while no one could expect them to give away the secrets on which their electric success depended, yet it was in such an assembly that the various difficulties encountered by the practical, every-day operator were brought to their knowledge for them to work out with the aid of those experimental advantages that naturally belong to the manufactory. Once discovering what the practical side was in need of, the electrician could labor intelligently to attain it. This is the electrician's view of the convention, and of course only comprises his side, yet is worthy of consideration.

There has been received at Chicago by Col. Clowry, general superintendent of the Western Union, a section of wood cut from the side of one of their poles standing in what is called the Colorado Desert. The wood is cut and splintered to an irregular depth of two and three inches by the fine sand blown against it, and, in the opinion of the district superintendent, sending in the block, inside of five years the poles in that locality will be worn through. The force of the wind and the penetrating qualities of the sand can be imagined from this, and if hard cedar proves so susceptible it is not surprising that animal life gives the locality a wide birth. The lot of a line repairer is not to be envied when there are crosses and grounds in this desert. If, in addition to the usual troubles, the sand of the desert makes itself known as a destroying element, the telegraph superintendent out there will find his business not lacking in entertainment.

The electrical supply companies report an improved trade in the West. The active young gentlemen handling the supplies, are feeling quite good over the outlook, and, what is more substantial, the orders that are coming in.

The use of coupon books for extra-territorial messages is a matter that a number of telephone companies are talking of dispensing with. The Central Union only issues them to named parties who subscribe for new lines, and this plan is found to work well in securing guarantees for other long lines. It is the policy of some companies to permit these tickets, which are sold generally at 20 per cent. discount, to be purchased by subscribers to be turned in at face value in payment of any tolls, and sometimes for regular rentals. Where an extra-territorial line is not crowded the sale of coupon books, at a discount where $10 or $20 worth are taken, may be of advantage in securing business that might not come at regular rates; but where lines are crowded—every second during the short business hours being of value—to sell these books at a discount is certainly not advisable in a financial sense.

As an illustration of the difference in business that results quite often where long-line rates are reduced, Superintendent Sunny, of the Chicago Telephone Company, knows of a case in point. The people of Michigan City, who were paying 40 cents a message of five minutes to Chicago, kept insisting that a 25 cent rate, competing with the telegraph, would greatly increase the number of calls and make the total receipts much larger. The change was made as desired a few months ago, and the result surprised the citizens of Michigan City, if not the telephone superintendent, and is given herewith:

Last month of 40 cent rate—166 messages	$66.40
First month of 25 cent. rate—148 messages	37.00
Loss to company	$29.40

Should this proportion continue, the reduction could not be classed as a successful financial move, nor be very likely long to remain in force.

While Messrs. Edison and Gilliland were in Chicago, on their way South, they received many callers, and appeared glad to be away from the constant strain their line of work compels. They expressed their intention of doing some extensive fishing, and it is safe to prophecy that their recreation will result in some new fish stories, if nothing else. Mr. Edison stated it was his determination to capture a shark, as he had a little plan he desired to demonstrate, in which his finny majesty served the purpose of a motive power. Pound a shark over the head with a club, and he gets mad and sweeps around with his tail at a 40 horse-power gait. To attach the proper mechanical apparatus connecting the shark's tail with a dynamo, with a convenient small boy to reach over with a club whenever more steam becomes necessary, was the idea expressed. To shut off steam, the shark's head was to be quietly stroked—a caress his tribe are very fond of, as all who have tried can testify—and a piece of cake fed him. This not only furnished a cheap motive power, but the "stock could be watered" to the heart's content of the most audacious manipulator; and another feature, Mr. Edison added, was that procuring the assistance of a "shark" was not going outside the electric light family! It is safe to look out for a heavy haul of fish by these electricians, even if they have to "water the stock."

The Wooley electric head-light, which has been in the repair shop at Indianapolis for some six months past, is likely to be heard from again. The Chicago, Milwaukee and St. Paul Railway Company had one placed on an engine for use on their line, and it was quite popular with the train men. The engine was made to do duty on the fast mail to the Northwest, and, colliding with the heavy end of a freight train, the electric apparatus was knocked off and rendered useless until built anew. The heavy fogs along the lake shore could not be penetrated by this light, nor by any light that has been discovered, but as a head-light it was useful and popular, and will probably be put on again, with improvements now being made.

Telephonic News

*** The *Bulletin Internationale des Telephones* says that the Belgian Government has arranged with the French and Spanish authorities for experiments in telephony between Brussels and Madrid. It is proposed to use the Dembinski microphone.

*** Long-distance telephoning has been successfully conducted between Rouen and Havre by the Van Rysselberghe system, and the public service is now open. It is intended to soon have connection between Rouen and Paris. Since January 1 the first public telephone office has been open in the French capital.

*** The question has been often asked as to what progress the Wire Gauge Committee are making who were appointed by the National Telephone Association, at Philadelphia, in September last. Let us have a national standard gauge, and let us hear at an early day what Messrs. Knight, Doolittle and Sargent have to say upon this very important subject.

*** The London *Electrician* says that the telephone is getting very popular in New Zealand. There are nearly 1,100 subscribers in the colony. The list continually goes on expanding, and a new annunciator is being prepared for Auckland and another for Wellington, while one has just been supplied to Dunedin. There are also about 100 country stations where the telephone is used, instead of the Morse instrument, for telegraphic purposes.

*** The following figures of the New England Telephone Company show a steady growth:

	No. telephone exchange subscribers.	Agencies,
May 1	14,788	2,231
June 1	15,167	2,270
July 1	15,331	2,329
Aug. 1	15,302	2,366
Sept. 1	15,383	2,381
Oct. 1	15,397	2,394
Nov. 1	15,508	2,345
Dec. 1	15,501	2,330
Jan. 1	15,545	....
Feb. 1	15,549	....

The printed report made for the six months ended March 31, 1884, estimated that for the current year ended December 31, 1884, there would be an increase of 2,000 in the number of subscribers. As the total number of exchange subscribers connected April 1, 1884, was set down in this report as 16,826 (deducting 1,000 "private lines" non-excluded) of which 2,200 were agency, and the number of subscribers December 1, 1884, was 17,831, of which 2,330 were agencies.

*** The last report of the New England Telephone Company was that for the six months ending March 31, 1884. Since that date some quarterly reports and some monthly figures have been made public, but no complete statement. For the nine months ended December 31, 1884, the gross earnings of the New England Telephone Company were $691,413, and the net earnings, $162,817. There was expended for new construction $154,724, and for construction at the Boston office, where new apparatus has been put in, $28,057, making the total construction expenditures for the nine months $20,000 in excess of the net earnings, and by this amount it is understood that the net floating debt has been increased. The figures by months are as follows:

	Gross Earnings.	Net.	Construction.
April	$75,463.59	$18,338.12	£13,133 82
May	75,368.53	27,341.08	17,634.66
June	77,217.80	22,344.44	12,196.16
July	76,950.50	17,203.12	19,910.55
August	76,963.06	21,033.70	16,609.22
September	76,760.74	14,933.99	14,575.49
October	77,900.75	14,598.81	19,086.19
November	77,704.67	20,962.85	22,746.85
December	77,084.03	6,061.10	15,831.02
	$691,413.67	$162,817.21	$154,723.96
Boston office			28,056.84
			$182,780.80

*** Oswald Wilson, for many years manager of the Erie exchange at Brownsville, has been transferred to Lampasas, succeeding A. W. Gorham, who takes Mr. Wilson's place at Brownsville.

*** The recent successful ball given by the employees of the telephone company at Kansas City, Mo., was not without its effects in other quarters, and as will be seen by the following from the *Inter-Ocean*, certain Chicago sharps thought they saw a scheme to turn a few dollars by banking on the reputation of the telephone company. B. E. Sunny, Superintendent of the Operating Department of the Chicago Telephone Company, writes to the *Inter-Ocean* as follows: Will you kindly say in your next issue that the parties peddling tickets among telephone subscribers on the West Side for a "grand ball to be given by the telephone employees for the benefit of W. C. Brown," are frauds, and that no such entertainment has been projected by the employes of this company. "W. C. Brown" is not, nor has he ever been, employed in its service. For obvious reasons the telephone company some time since prohibited its employees, under pain of dismissal, from associating its name in any manner with the sale of tickets to any entertainment. Subscribers are requested not to purchase tickets from persons representing that their sale is for the benefit of the telephone employees of Chicago, and in the present case to turn the peddlers over to the police.

*** Late advices from Buenos Ayres give the following information respecting the business of the United Telephone Company of the River Plate, Limited, for the year 1884. This company operates the Blake and Bell instruments in that city and the River Plate country, and acquired the plant from the Continental Telephone Company in 1882, the Continental stockholders still owning a large interest in it. Total number of sub scribers Jan. 1, 1885, 1,355, an increase of 13 per cent. for the year:

Estimated increase in value of plant, after writing off liberal amount for depreciation, £3,500, say	$17,500
Debts of company were reduced £7,000, say	35,000
Receipts from subscribers last nine months of 1884	$59,775
Receipts from pay messengers last nine months of 1884	1,905
Receipts from sales of instruments and supplies last nine months of 1884	66,285
Total receipts for nine months	$127,965
Estimated at same rate for January, February, and March, 1885	31,995
Receipts for the year ending March 31, 1885	$159,960

CASH STATEMENT JAN. 1, 1885.

Cash on hand and in bank	$10,100	
Notes and bills receivable	12,300	
		$22,400
Debts due in Buenos Ayres and Europe	$ 4,971	
Debts due Continental Telephone Company	30,000	
Debts due Tropical Company Syndicate	12,831	
		$47,802
B. A.—About 4 per cent. discount		$25,402

The estimated expenses were $97.500. The capital is £200,000, and the value of the plant $250,000. The Continental Company, of Boston, expended over $100,000 there.

The Telephone Monopoly.

The Boston *Herald* says: It is not at all strange that considerable opposition should be shown to any legislative proceeding which seemed calculated to increase the profits of those interested in the Bell Telephone Company. Probably the financial results of this invention have not been, and will not be, any greater than those which attended the equally wonderful discovery of Sir Henry Bessemer, but the use of the process of converting iron ore to steel has been confined to comparatively few persons, while, from the necessities of the case, in order that the telephone patent should be of profit, it was necessary that its use should be popularized to a large degree. The users of the Bessemer patent have made, in consequence of it, large amounts of money, and, with this tangible result in their pockets, they can hardly find fault with the tax or royalty which those owning the patent have exacted. It is probable that the use of the telephone has been of great service to those who have hired the instrument, though it might be difficult to demonstrate the value of the use in dollars and cents. Still, unless the gain made or the convenience secured equaled the tax exacted, it is not at all probable that subscribers would continue to pay the toll. As it is, no one is compelled to use it, and whether a business man has or has not telephonic connection with his customers does not, in the main, seriously interfere with his business success. In a word, if the tax seems too large, it can readily be evaded by having the telephone taken out. Still, there is always a feeling that the pecuniary results derived from an invention should not be unduly exaggerated, and if a method could be discovered by which champagne could be made and sold at a quarter of a dollar a bottle, and yet not fabulous returns to its inventor, we have not the least doubt that people would be found willing to petition the legislature to have the price of the aforesaid champagne cut down to fifteen cents a bottle on the ground that the holders of the patent were making too much money at the price they were receiving. The telephone is for the present unquestionably a monopoly, but so is every invention that receives the indorsement of the patent office, and if this is a reason for complaint, then our entire patent system needs to be swept away, and with it all the inducements to inventive genius that are now held out. For it should not be forgotten that one great success like this does more to stimulate the inventive energy of the American people than thousands upon thousands of small discoveries, which either pay their inventors nothing at all or but an insignificant return. While the owners of a patent such as the telephone are eager to obtain every cent of profit they can out of their possession, they are also aware that, as it is only by extensive usage that profits are possible, therefore it is necessary to grade the scale of charges in the way that will insure this patronage.

Telephones in Paris.

The Societe Generale des Telephones, of Paris, has extended its facilities for the dispatch and reception of telegraphic messages. This extension has been in public use since February 15. On paying a supplementary rental of fifty francs a year, and the deposit of a sum intended to cover the amount of the telegraph tax to which the company is responsible to the State, the subscriber can transmit and receive telegrams. The text of the dispatch is necessarily in French, and must be preceded by the word "Telephone" to prevent its delivery by the ordinary method. The company transmit the message by telephone, confirming the wording by the earliest post.

The Telephone in Farming.

Major Bell, of Bell Farm (Qu'appelle River Farming Company, Canada) consisting of 13,000 acres under cultivation, gave a London journalist the following description of the use of the telephone in farming: "One feature that is somewhat novel, perhaps, in our management is the use of the telephone. At 8 o'clock every evening I press my button and put myself in communication with my divisional foremen. I give them, perhaps, ten minutes each, but in each case the others hear what I am saying, though they are four or five miles apart, both from me and from one another; every man must carry out my orders, right or wrong; if he does not, off he goes. Every horse, too, has its appointed task set every evening, sixteen to twenty miles a day; but here I am more merciful, and if a horse gives out, why, the foreman only has to go to his telephone and tell me of it and I reduce the animal's task, taking off two miles a day, perhaps. The whole machine is worked in this way as easily by a single overseer as if it were a matter of 13 and not 13,000 acres; and all the discussion about the comparative advantages of large and small farming is really rather out of date, for the telephone enables you to combine them both. The telephone—and federation, which is quite as applicable, I assure you, to farms as to States. Every 200 acres has a cottage on it, with a man living in it rent free, and having charge of three horses. This system gives us an immense pull over other farms, such as Dalrymple's, the next biggest to ours, which are worked from a single center, so that a team will have to go four or five miles, perhaps, to get to its work; that is sheer waste. These homesteads are grouped into divisions, of which there are five on the farm altogether, with a divisional foreman responsible for each. The men employed in each division report every day to the foreman, and the foremen report to me. Local matters are left to them; imperial concerns are reserved for me at my telephone."

Observations by an Old Telegrapher.

Being an old telegrapher, in fact the oldest in Texas (having worked at the business in Houston in 1860 for the old Star State line, long since swallowed up by the Western Union Telegraph Company), I believe I can offer a few facts that might prove of great interest now that two great companies—the Baltimore & Ohio and Western Union—are at war; the former to attain a foothold, which, if successful, will give patrons a choice of routes, as it were; and the latter to exclude all competition in order to monopolize and enjoy the great fat plum of telegraphy.

The great point made by Colonel D. P. Sheppard (the father of telegraphy in Texas, as he is styled by your Austin correspondent in his interview) is that the Baltimore & Ohio only desires to establish offices at paying points, such as large cities, and give the non-paying stations the go-by, and asserting that small stations are an expense to the Western Union, when in fact the reverse is the case. I assert, without fear of contradiction, that the small stations touched by the Western Union pay more in the aggregate than the large offices. Any telegrapher at a small station on a railroad will tell you that his salary is paid by the railroad company, and that he works for the Western Union Company on commission, which is, in nine cases out of ten, 10 to 15 per cent. of the receipts, which, outside of about 25 cents, worth of report and message blanks per month, is all the expense assumed by the Western Union Telegraph Company. Take any small station, along any of the railroads; most of them take in from $10 to $50 per month; very few of them less than $30 or $40. Deduct 13 per cent. from $40, which makes $6 commissions on the operator's salary, and leaves $34 due the Telegraph Company. Bear in mind, the railroad company pays the operator's salary, as the operator is as necessary to the railroad as an agent, and, in fact, most of the agents are operators, and do the work of the Western Union Telegraph Company for 15 per cent. of the receipts of telegraphing. Will any one assert that, with the hundreds of offices in Texas alone, not taking into account the thousands of offices in other parts of the United States, that these amounts, all the way from $10 to $50, remitted to the treasurer of the Western Telegraph Company, do not amount to millions in the aggregate? Why, sir, were it not for what they call non-paying offices, the Western Union Company could not sustain itself.

The telegraph company furnishes an instrument at these small offices, which lasts for years, and they are at no earthly expense, excepts a few blanks, a little blue stone and the 15 per cent. commission allowed the operator. The railroad companies furnish the office, lights and fuel. These are facts, as any operator working for railroads will substantiate. The smaller offices, I assert, are the great lever that turns the dollars into the telegraph company's treasury, and not, as many telegraphers declare, non-paying institutions. I have no interest in the matter, only to call the attention of outsiders to the great misstatements so often made by officials of the Western Union Telegraph Company, that small offices are non-paying.

The Telegraphic Facilities of the Union Pacific in Dispute.

William H. Armstrong, United States Commissioner of Railroads, has completed his report regarding the allegation that the Union Pacific Railroad Company grants special telegraphic facilities on its line to the Western Union Company. The Baltimore and Ohio Telegraph Company recently asked the officers or the Union Pacific Company for the same privileges and facilities that were extended to the Western Union. The application was not successful. President Bates, of the Baltimore and Ohio Telegraph Company, went to Washington a few days ago, and had an informal interview with Commissioner Armstrong and counsel for the Union Pacific Company. The demand of the Baltimore and Ohio Company was as follows:

"That the Union Pacific Railway Company and all the land-grant railroads shall accept from the Baltimore and Ohio Telegraph Company a general telegraph business upon the same terms as to rates and conditions and the keeping of accounts, as the Union Pacific and the other land-grant roads accept like business from the Western Union Telegraph Company, and that the Union Pacific Company shall accept at its stations messages which may be tendered to its operators destined for points on the Baltimore and Ohio Telegraph Company's lines, as such destination is indicated in the message, and transfer at the connecting points such messages to the Baltimore and Ohio Company, and, further, that in the conduct of such general exchange of telegraph business the same facilities shall be given us—namely, wire or mechanical connection, the keeping of accounts, etc.—as are furnished to the Western Union Telegraph Company."

On behalf of the Union Pacific Railway Company it was said that the view entertained by its officers was that that company is limited to dealing with the Baltimore and Ohio Telegraph Company precisely as if it were an individual offering a message or a succession of messages. The Union Pacific people do not believe that their duty in this matter extends to the keeping of a system of mutual accounts, the extension of credit, or the affording of mechanical connection. Commissioner Armstrong's conclusions are as follows:

"It will be observed that the real controversy—being the claim of distinct affirmative rights upon the one side, as distinctly denied upon the other, and both arising under variant construction of the same law—is, as it stands at present, a question clearly within judicial adjudication. I have deemed it to be within the spirit of the resolution to embody in my reply the respective views of the rival interests which are involved. Whether the question thus presented is one for legislative action must rest exclusively in the discretion of Congress."

This matter, it is said by some of the persons interested, will be brought to the attention of the next Congress.

A Canadian Cable.

The Toronto *World* speaks eloquently and to the point on this question: "By all means a Canadian cable is specially wanted in these troublous days. Great Britain may be at war with Russia soon; nay, we may any day hear that war has been actually declared. It is a burning disgrace both to the mother country and the Dominion that as yet we have no cable of our own, but are dependent upon French, American and Anglo-American companies for our cable news. The important interest that Great Britain has in maintaining communication with Canada, also through Canada to the Pacific both by railway and telegraph, has never half been appreciated either here or in the old country. But if there be war with Russia the authorities will get new light on this subject flashed into their eyes, and that in the most peremptory manner."

Ten American Cables—Not One Canadian.

At present there are ten American cables, eight of which are under the control of the pool, and two of which (the Commercial or Mackay-Bennett cables) are worked independently. The eight pooled cables are as follows:

	Cables.	Capital.	Per cent. of receipts with pool arrangmt's.
Anglo-American Co.	4	£7,000,000	48.83
Direct U.S. Cable Co.	1	1,214,200	16.27
French Cable	1	1,680,000	12.40
American Cable Co.	2	2,800,000	22.50
Totals	8	£12,694,200	100.00

The Western Union Telegraph Company, however, has not been getting a cent. from its cables for months, as the agreement provides that they are to have 22½ per cent. when both cables are working, 12½ per cent. when one is working, and nothing when neither is in operation. Besides, the Bennett-Mackay cable appears to have become the favorite all at once, and is getting all the business it can handle. The absence of a distinctly Canadian cable is at all times a matter of serious national concern, but it is specially so in these troublous days. All the cable despatches that appear in the Dominion papers are prepared by and for Americans, often by Fenians, always in their interests and of every other that is anti-British. Thus the public opinion of this country is being steadily but surely and rapidly educated in ideas hostile to and subversive of all our oldest and most cherished traditions, and the silly newspapers reproduce them with as much complacency and self-satisfaction as if they were not undermining all healthy public sentiment.—*The Montreal Shareholder.*

The Questions Between the Baltimore and Ohio and Western Union Solely for Judicial Interference.

The Hon. W. H. Armstrong, Commissioner of Railroads, has written the following letter to President D. H. Bates, of the Baltimore & Ohio Telegraph Company, in answer to the latter's letter of March 9:

DEPARTMENT OF THE INTERIOR,
OFFICE COMMISSIONER OF RAILROADS,
March 11, 1885.

The Hon. D. H. Bates, President and General Manager of the Baltimore & Ohio Telegraph Company, 63 Broadway, New York:

SIR: I have to-day received and very carefully read your communication of the 9th inst. The quotation you make from my letter of March 2 to the secretary of the Interior, in reply to the resolution of the Senate, does not adequately convey the substance of that reply. You will observe that the resolution inquired: First, whether the railroad companies have "constructed and are maintaining and operating their own lines of telegraph;" and second, "whether telegraphic messages are accepted and transmitted for all persons and corporations, without discrimination as to price and other conditions." In the hearing before me it was not disputed, nor does your letter of the 9th inst. question, that these companies did own the lines of telegraph which they have themselves constructed and operate, and over which they transmit all messages which are received, whether from individuals or corporations, but I did not think that a specific answer to the precise inquiry sufficiently informed the Senate of the real controversy, and I, therefore, in a spirit of fairness to both companies, embodied in my reply the claim of the Baltimore & Ohio Telegraph Company as formulated by you, and the reply thereto on behalf of the Union Pacific Railway Company as formulated by Gen. Swayne.

The only extract you make from my letter is as follows: "The railroad companies, in granting these privileges (to the Western Union Company), have not alienated their control of their own telegraph lines, nor refused to receive or transmit telegrams for all persons and corporations without discrimination." This is but a part of the paragraph, the whole of which reads as follows: "It will be perceived that both these corporations claim that they have constructed and are maintaining and operating their own lines of telegraph, and that they do accept and transmit messages for all persons and corporations without discrimination as to price and other conditions." While this is, perhaps, a sufficient answer to the specific inquiries of the resolution, it is proper to say that the underlying question is a controversy between rival telegraph companies. I do not deem it to be within the purpose of the resolution to detail the several contracts between the Pacific Railroad Companies and the Western Union Telegraph Company, which operates a general telegraph line along all their roads. The railroad companies, in granting these privileges, have not alienated their control of their own telegraph lines, nor have they refused to receive and transmit all telegraphic messages for all persons and corporations, without discrimination as to price or other conditions. This, as to any particular message, whether from individuals or from rival telegraph companies, is not controverted, but it is claimed by telegraph companies which compete with the Western Union that they are respectively entitled to insist upon the right, not for particular messages, but for an arrangement under which they shall be enabled to transact a rival and competing telegraph business under equal or equivalent facilities as those accorded under existing contracts to the Western Union.

Quoting only a single sentence from the above paragraph to which I have referred, you say: "To this conclusion of yours I take strong exception. Your consideration of the questions involved—as stated by yourself—was not judicial, but you have, however, expressed broadly a conclusion that if not controverted or protested against at once will probably be construed as a ruling, to the effect that those railroad companies have not violated the statutory provisions of their charters or corporate obligations in this respect."

I cannot agree with you that my letter is capable of such construction, and particularly in connection with the statement of the claims of the Baltimore & Ohio Telegraph Company and the Union Pacific Railway Company as formulated by the parties, respectively, embodied by me in my letter without alteration. You omit also to notice that at the conclusion of my letter I say: "It will be observed that the real controversy—being the claim of distinct affirmative rights upon the one side as distinctly denied upon the other, and both arising under variant construction of the same law—is, as it stands at present, a question clearly within judicial adjudication. I have deemed it to be within the spirit of the resolution to embody in my reply the respective views of the rival interests which are involved. Whether the question thus presented is one for legislative action must rest exclusively in the discretion of Congress."

In your letter you say: "Our demands, as expressed in your letter, are definite and reasonable, and, we believe, warranted by the law and the facts. The reply of the railroad company, on the other hand, is evasive, and, intentionally, or otherwise, misleading." It was not for me, in answering a resolution of the Senate, calling only for facts, to pass upon the *bona fides* of the claims asserted by either party. I submitted them both to the Senate in the precise language in which they were expressed by the parties themselves. At the hearing before me, on Feb. 27, I distinctly disclaimed any authority to hear the parties in any judicial capacity, and announced that the hearing, which was at the request of the parties, was only for the purpose of ascertaining the facts, to enable me to report fully and accurately to the Senate the entire situation and all the facts as they are, for its consideration and determination. I am at a loss to know what more I could have done to fairly present to the Senate the controverted rights of the parties. After carefully revising all the facts, I see no occasion to change my opinion that the whole controversy is one of appropriate judicial inquiry, and, as it seems to me, this would be the shortest, no less than the surest, way to determine the relative rights of the parties. The delay which you seem to apprehend would be no greater than that which is incident to all ordinary litigation of private rights. That it would not have been appropriate for this office to attempt to pass upon these questions is, to my mind, entirely clear.

TELEGRAPHIC

.... The Eastern Union Telegraph Company, at their annual meeting, held at Greenpoint, elected the following officers for the ensuing year: President, John B. Young; superintendent, W. F. Hammond; secretary and treasurer, William H. Wiggins. A dividend of 22 per cent. was declared.

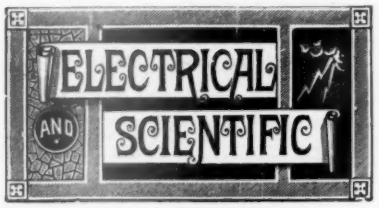
.... The cable rates between New York and Great Britain and France have been reduced to 40 cents per word, and messages will now be received at all Western Union offices at these rates by the Anglo-American Company. Formerly 50 cents was charged per word. The Mackay-Bennett Company, however, with a view of securing business, have seen fit, upon the opening of its new line, to underbid the old-established companies, by offering to take messages at reduced rates.

.... "The need as I see it just now," promptly responded Mr. Summers, who is quite a dry joker, "in view of certain legislative action, is to find out how to get along without wires and poles. However, there is one thing needed before the perfect handling of the great mass of messages continually being sent and received can be secured, and that is to do away with the changes from the written message into the Morse alphabet and then back into Roman characters. These two changes must certainly increase the length of time for each message as well as the liability of error."

.... It might be supposed that the high charge for messages over the Atlantic cables would limit the amount of business done, and the messages would be practically confined to the transmission of press news, for which they have contract rates. This is not the case, however. As to the extent of the messages that pass over the Atlantic cables, it is difficult to speak with certainty. It is known that the enormous number of 1,100,000 words has been transmitted in one month, more than 1,500 words an hour. This was when the rate was about twelve cents a word. The receipts from the workings of the associated cables are "pooled" and divided among the companies in proportion, varying according to the number of cables in working order each possesses. Taking the largest companies, its traffic receipts in six months approximated $1,200,000, and the cost of working, salaries, rent, maintenance of land lines, use of patents, office expenses, and so forth, was about $180,000 in that time.

Atlantic telegraphy is still young and undeveloped. Its working capacity under certain conditions is known, but it is not known how soon these conditions may be altered or at what rates messages may be sent. The rates for messages hitherto have been heavy, and thus the extent of the work is minimized, but with the increase of the number of cables, and with a growing competition, lower rates will become current, and every year the growth of interest, of business and of friendly relationship between the two great communities will increase the number of the messages, of business, of news, of social life.

The idea of mid-ocean stations has been advanced, and experiments with broken cables in the deep seas show that the idea is not altogether visionary. If the end of a severed cable can be grappled for, picked up and buoyed and left until the steamer can make the voyage to port and return with appliances for splicing it, it seems entirely feasible that a line connecting with the main cable could be buoyed and messages transmitted from mid-ocean. It is not possible at present to say what advantage to commerce would be derived from such an arrangement, but there would be direct communication with incoming and outgoing steamers at intervals of say five hundred miles. A vessel driven out of its course or disabled could seek one of these stations, and by making its condition known, call for any assistance.



* * The attempts lately made to determine whether the electricity of thunder storms is generated by the evaporation of water, or by the condensation of vapor, show results which indicate that no electricity is produced by the evaporation of pure water. The investigations also made by M. Kalischer, with most delicate apparatus, fail to show that condensation or the formation of hail is a source of atmospheric electricity.

* * Mr. E. Goldstein, in an article on electric conduction in the vacuum, discusses some experiments in which a carbon filament lamp was employed, the filament forming one electrode, a platinum wire being inserted through the glass to serve as another electrode for the discharge, which was obtained without an induction coil, with electromotive forces of about 300 to 350 volts.

* * The first arrangement in Paris for supplying private houses with electricity for illuminating purposes is now in working order, and from all that is said concerning it there is every likelihood that it will be extended. Those who initiated this project wisely obviated any necessity for kicking against the pricks of civic regulations, by using as a motor for the dynamo-electric machines a gas engine which can legally be employed in cities.

* * The New York Electrical Society elected the following list of the officers for the ensuing year on Friday last: President, P. H. Van der Weyde; 1st vice-president Geo. B. Scott; 2d vice-president, Geo. A. Hamilton; 3d vice-president, T. A. Edison; 4th vice-president, W. J. Johnston; 5th vice-president, C. O. Malloux; 6th vice-president, Geo. Worthington; treasurer, F. W. Jones; executive committee, P. H. Van der Weyde, Geo. B. Scott, F. W. Jones, E. L Bradley, J. A. Seeley, H. A. Sinclair, Eugene Lynch Jr., Jno. M. Pendleton; secretary, A. A. Knudson.

* * A new observatory has been established on a high mountain in the south of France, known as Pic du Midi. It is on this spot that M. Thillon has erected his most powerful spectroscope, and reports that there are to be seen daily forty rays of the chromosphere in a region where ordinarily only eight have been visible. The new and interesting observation is also made by him that the granulations of the photosphere are visible in his spectroscope as fine striæ extending through the whole length of the spectrum. What is more interesting still is that similar granulations seem to show themselves in the chromosphere, being indicated by the character of the hydrogen lines, which are broken up into small pieces, instead of being continuous, a curious fact not hitherto observed or noted.

* * The method recently adopted by the authorities of Paris for securing accurate and uniform time is believed to be perfect. There are twelve secondary clocks electrically connected with the observatory, and regulating every second. These secondary clocks serve as central clocks for the regulation of a large number of public clocks, which are regulated hourly from the central clocks; and the regulation of the latter is accomplished by means of electro-magnets that act upon the armature attached to the pendulum, after the manner of Steinheil. The hourly regulation of the public clocks by these central clocks is effected by five different systems, in some of which the length of the pendulum is altered, in others the hands are moved forward or back, while the rest are connected in some manner with the escapement. In Berlin six public clocks connect with the one at the observatory. The beats of each pendulum are made to coincide with those of the normal clock by the action of the current upon permanent magnets that are attached to each pendulum, and swing in and out of a coil of wire or solenoid. The Time Telegraph Company of New York control this system.

* * From experiments on partially closed magnetic circuits of iron, Mr. Werner Siemens has been led to infer that the harder a specimen of iron is the greater is the value of the magnetizing force at which the maximum of permeability is observed. He also finds that the magnetic resistance of air is from 480 to 500 times as great as that of iron.

* * The following directions are given for amalgamating zinc, and, when used for batteries, this must be done carefully: First, wash the plates in water acidulated with sulphuric acid and then in pure water, when they must be immersed in a solution composed of three-quarter part of mercury, one of nitric acid and two of muriatic acid. When the mercury is well dispersed, two more parts of muriatic acid are to be added. The immersion should not continue for more than about thirty seconds, after which the plates are to be again washed in pure water. —*London Electrician.*

* * Dr. Kayser laid before the Physical Society, Berlin, on January 23, a photograph of lightning taken in France, and probably under the same minimal pressure as that under which he had himself taken his recently published photograph, the lightnings in France having been photographed three days earlier than those in Berlin. On the small gelatinous membrane sent to Dr. Kayser, still better than on that of an enlargement of it which he had prepared, the extraordinary manifold ramifications of the lightning were beautifully represented.

* * MM. C. Friedel and J. Currie have sent a note to the Academy of Sciences, Paris, on the pyro-electricity of the topaz. From their experiments they conclude that the crystals of the topaz possess not only the already determined pyro-electric vertical axis parallel to the axis of the prism, but also a horizontal axis of pyro-electricity present at least in some specimens, examined by them. Owing, however, to the limited number of these specimens it was impossible to define clearly the position of the horizontal axis. The intensity of the electricity developed varied with the specimens themselves.

* * Dr. Shrivanoff's primary battery appears to be well adapted for generating an electric current for lighting purposes where steam engines and dynamo-electric machines or accumulators are inadmissible, and when expense is a matter of very secondary consideration. This battery is composed of boxes containing a number of small cells not more than an inch in width, in which are placed zinc plates and chloride of silver. The excitant is a weak solution of potash. It can work for many hours without any very sensible diminution of strength, and when its power is exhausted the chloride of silver can be easily reconverted.

* * Professor G. Forbes has delivered a series of Cantor lectures on the distribution of electricity, before the Society of Arts, London. With regard to the economical introduction of electricity for purposes of illumination in populous centers, he said that the first thing to be done was to estimate as closely as possible the probable consumption in various parts of a district, and the variations in quantity which might be expected at different times of the day and at different seasons of the year. In the next place, there must be careful and exact calculations made for determining the size of mains, whatever the system of distribution might be.

* * Electricians are not agreed as to the feasibleness of the scheme to substitute electricity for horse power in the operation of street railways, but the special committee appointed by the American Street Railway Association to investigate that question, reports that the prospects are flattering. The electric railway now in operation at Cleveland is a surface line, and the conductors which supply electricity to the motor of the car are placed in a conduit, similar to the conduit which contains the cable of the cable railways, and a brush attached to the car is said to keep the crevice of the conduit free from obstructions of mud or snow. A grade of 500 feet to the mile occasions no difficulty, and the line is to be extended to twenty miles of track next summer, the proprietors say. Few persons appreciate the possibilities of electricity as motive power for railways.

* * The *London Electrician* says that in a recent note we referred to the experiments of M. Toulet, which show that when a salt is dissolved in a liquid, and the solid body is immersed in the solution, there is an attraction between the salt and the solid body, independently of chemical action. M. Toulet attributes to this attraction, which is proportional to the surface of the immersed body, the following phenomena: (1) Impurity of most chemical precipitates, especially those that are gelatinous. (2) Diminution of the concentration in saline solutions discolored by animal black, or alkaloids. and also the action of glutinous substances, such as blood and albumen, used for clarifying liquids. (3) Purification of surface water and sewage. (4) The fact that clay, remaining indefinitely suspended in distilled water, is quickly precipitated in water containing salts in solution.

* * The new voltaic battery, by M. Radiguet, is described at length in the technical journals. In this battery, peroxide of lead surrounds the carbon plate as it lies on the bottom of the cell, and the other plate is also of carbon, covered with fragments of retort carbon platinized. The two plates are placed one above the other, but separated by a sheet of parchment paper, which divides the containing vessel into two compartments. A saturated solution of chloride of sodium, or common salt, is filled into both compartments until the upper carbon fragments are partly immersed in it. The electromotive force is 0.6 volt. The negative pole is that carbon plate which is not in contact with the peroxide of lead. If other saline solutions, such as sulphate of ammonia, sulphate of soda, chlorhydrate of ammonia, or even dilute sulphuric acid, be used instead of the solution of salt, the electromotive force does not sensibly vary.

* * In a recent communication to the Societe des Electriciens, Paris, Dr. Boudet established the fact that the method of excitation by the discharge of the condenser, employed in physiological laboratories, and introduced by him a few years ago into therapeutical practice, is the only one which has hitherto given exact results always comparable with one another. It is similar to the excitation by the galvanic shock, but possesses over the latter the advantage of not irritating the skin by its chemical effects. The condenser should be preferred to the induction coil whenever it is not required merely to awaken the sensibility of the skin, and when it is desired to take into account the excitation employed, because with coils induced currents are used irrationally, and without seeking to appreciate their mechanical value. Dr. Boudet concludes by observing that, as electricity is *par excellence* the science of progress, the physician who employs electric currents should, more than any other, avoid lagging behind.

* * In a recent note before the French Academy of Science, M. Mascart remarks that all methods give a greater length than 106 centimeters of mercury, except that of neutralization (*amortissement*), while this method has, on the contrary, always given a lower number; and he inquires if a more complete interpretation of the theory might not furnish an explanation of this difference. It results from his researches that the correction to be made in the approximate calculation of the resistance, taking into account the co-efficient of self-induction, should be somewhat less than that usually made, and that the strong induced currents should give the bar, in a transverse direction, a temporary magnetization, which must be taken into consideration. These two corrections contribute to increase the value of the intensity of resistance hitherto found by the method of neutralization, which fact explains why the figures which it gives have always been found under the mark.

* * It is stated that Professor Jas. Warren, of Los Angeles (Cal.) electric light station, is the inventor of a new process of reducing ores, which is done by the aid of electricity. One day, while examining a piece of gold-bearing quartz, he accidentally let it fall into one of the dynamos, which was in motion at the time. On looking for the piece of quartz next day, he found it in the dynamo, and to his surprise the gold in the quartz had been melted, and had run to one side of the rock, forming a beautiful button. Prof. Warren immediately instituted a series of experiments, and has succeeded in evolving a process by which gold, silver and copper can be instantly smelted from concentrations by a powerful electric shock, which almost equals in its intensity a stroke of lightning. The experiments so far have failed on lead and antimony ores.

Report of J. F. McElroy, Superintendent Michigan School for the Blind, Lansing, Mich.

The installation of a 300-light isolated Edison plant was completed in February, 1884, since which time it has been in successful operation every night. The working of the light has been entirely satisfactory. Advantages over any kind of gas light are numerous and important, such as steadiness, entire freedom from danger of fire, effects of its accidental escape into the room which attend the use of gas, easiness of control, slight heat, *great cheapness*, and absolute freedom from vitiation of the air.

The cost of running for 5½ hours 98 sixteen-candle power Edison lamps, the average number in use is as follows:

(1) For 99 lbs. of soft coal @ $3.60 per 2,000 lbs.	$0 17⅘
For oil and waste	02¼
Breakage of lamps	01⅕
Wearing of commutator and brushes to make good the warrant of Edison Company	02⅝
Depreciation on engine to make good the guarantee of manufacturers	07
Total cost of running 98 16 candle-power lamps for 5½ hours, exclusive of interest	$0 31 1/12
(2) Interest for one day on investment, except wiring of buildings, $4,334.00, @ 6 per cent. per annum	71
Cost of running 98 lamps for 5½ hours, including interest	$1 02 1/12
Cost of running 98 lamps, sixteen candle-power, for one hour exclusive of interest	05⅔
Cost of running 98 lamps, sixteen candle-power, for one hour, including interest	18½

The wiring of the building saves the expense of putting in gas pipes, and is a matter on which there is absolutely no depreciation. For these reasons it is deemed proper not to compute interest on the cost of wiring.

The Domestic Electric Manufacturing Company.

This company, whose office is at No. 19 Pearl Street, Boston, is devoting its entire attention to the manufacture and sale of electric gas igniters. The first instruments of this sort which it produced and sold contained a chloride of silver battery. They gave good satisfaction for a time, but there was a limit to their usefulness. The instrument now made contains no battery, no coil and no magnets. The current is produced by static induction, and the igniter is of what is called the "dynamo form," although, as a matter of fact, that is a misnomer. The spark is produced, by the aid of a simple yet ingenious mechanism, by lightly pressing on a projecting knob, and is sure to light gas whenever for an instant in contact with it, although it will not ignite either gunpowder or gasoline. There is practically no wear-out to it, the working parts being very accurately and substantially made. Absolutely safe and rendering the use of matches or tapers unnecessary, it ought to come into general use, as well as a measure of economy as of safety. It is manufactured for the Domestic Company by the Western Electric Company—a guarantee of good workmanship.

Electricity as a Preventive of Scale in Boilers.

The mineral sediment that generally sticks to the sides of steam boilers, and the presence of which is fraught with the utmost danger, resulting, in many instances, in great injury to life and property, besides eating away the substance of the iron plate, was referred to in a paper lately read by M. Jeannolle before the Paris Academy of Sciences, in which the author described a new method of keeping boilers clean. This method is as follows: The inside of a steam boiler is placed, by means of piles of a certain power, in reciprocal communication, the current passing at one end through positive and at the other through negative wires. In incrustated steam boilers, at a temperature ranging from 212° to 300° F., and a pressure of from thirty to ninety pounds to the square inch, the current thus engendered decomposes the accumulated salts and precipitates them, from which they may be easily removed, either by means of a special siphon or by some other mechanical process. When boilers are free from fur, and where it is intended to keep them free from such, a continuous current may be set up, by means of which the sedimentary salts may be decomposed, and a precipitate produced in a pulverized form, which can be removed with equal facility. From a series of minute experiments made by M. Jeannolle, it appears that in order to render the various actions of electricity perfect, it is necessary to coat either with red lead or with pulverized iron, or with any other conductor of electricity—an operation which must be repeated whenever the boiler is emptied with a view to cleaning out. The above system is being advantageously applied in Calais for removing the incrustations from boilers. The two poles of a battery of ten to twelve Bunsen elements are applied to the ends of the boilers, and after thirty to forty hours the deposits fall from the sides to the bottom. When a boiler has been thus cleared, the formation of new deposits may be prevented by applying a much less energetic current under the same conditions.

Don't call a man a donkey because he impatiently exclaims through the telephone that it's funny you can't hear him; he hears you easily enough. He might suspect that you were trying to insinuate that his superior breadth of ears had something to do with it.

Silvered Incandescent Lamps.

There are many situations in which a considerable part of the light of an incandescent lamp is thrown on to surfaces, such as wall papers, which reflect but a very small portion of that which they receive, and thus much of the illumination is lost. To remedy this, several patents have been taken out for silvering one side or the top of the globe, so that the whole of the light may be emitted in one direction and thus be turned to useful account. The patents of Messrs. Lorraine and Waters, and others, have been acquired by Messrs. Woodhouse and Rawson, London, who are now producing lamps of all sizes silvered at the top, bottom or side, according to the position in which they are to stand. By this device the outline of the filament is lost, and the globe is filled with a soft mellow light very agreeable to look at.—*London Engineering.*

The Chesapeake and Potomac Telephone Company, one of the companies in which the American Bell has a stock interest, is said to be earning 4 per cent. upon its capital of $2,650,000, or something over $100,000 net per year, but will defer payment of dividends until the first quarter of 1886, in order that it may apply present earnings to underground construction. It has some $30,000 more of this work on hand, and a debt of about the same amount. These expenses met, one of the directors says, the company hopes to begin paying six per cent. on the stock. The stock is quoted to 50 bid, 60 asked, with no transactions. The company controls for telephone purposes the State of Maryland and the District of Columbia, with exchanges in Baltimore, Washington, Cumberland, Emmittsburg, Frederick, Hagerstown and Westminster, Md

The Otoscope.

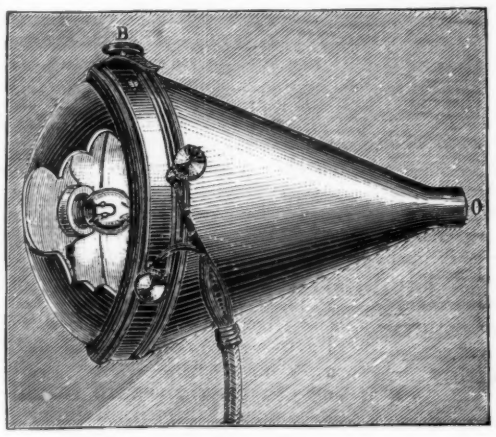
Prof. Leon Le Fort has recently submitted to the Academy of Medicine, in the name of Dr. Rattel, a new otoscope, and apparatus for illuminating the interior of the ear, which *La Nature* describes as follows: The instrument is illuminated by a small incandescent lamp with carbon filament. The lamp, which is of 2 candle-power, is placed in the interior of the instrument. An accumulator yielding 13 ampere-hours is capable of lighting it during a minimum of 6 hours.

The reflector forms a portion of an ellipse, one of its foci corresponding with the lamp, and the other with the extremity of the instrument.

A commutator allows of establishing or interrupting the current at will. A rheostat in connection with the accumulator renders it possible to graduate the light by causing the filament to be heated from redness to a maximum of incandescence.

The opening by which the observations are made is of such dimensions as to allow the passage of any instrument necessary for the treatment of the diseases of the ear.

This mode of lighting and of reflection may be applied to a Brunton otoscope, which is used for the examination of other natural cavities, such as the nose, the pharynx, etc. Elliptical reflectors do not appear to have been hitherto brought into use.



THE OTOSCOPE.

By way of conclusion, Prof. Le Fort contends that this new and essentially practical otoscope supplies a real want, and that it appears to be destined, thanks to its excellent arrangements, to render great service in the treatment of the diseases of the ear.

Dr. Rattel's apparatus has been constructed by M. Galante.—*London Electrical Review.*

Electric Lights for Greenhouses.

The beautiful exhibition of plants and flowers given at the Rose Reception in aid of charity, has absorbed the attention of growers, florists, and persons interested in horticulture this week. In the extraordinary collection there was not a plant or flower that was not a specimen. The orchid display was the finest ever made in America, and the show of roses was superb.

The demand for the fine varieties of roses in the depth of winter is taxing the ingenuity of florists in all the principal cities of the Union. There is not much difficulty in producing the ordinary tea or monthly roses, but the gorgeous "fancy hybrids," as they are called, such as Baroness Rothschild, Gabriel Luizet, and others of that class, are so far great rarities in the months of December, January, and February. The modern construction of rose-houses makes at least nine-tenths of the whole surface glass, the object being to get all light possible on the plants, cultivators realizing that the greatest development of foliage, flower, and fruit is in seasons when there is the largest amount of light. To attain this object a novel suggestion was made in a recent number of the *Scientific American* by one of the most successful horticulturists of the age, that there is good reason to believe that the use of electric light in conservatories and in rose-houses would materially further the development o plants. This opinion is supported by a veteran New York florist who, in his experience in using plants for decoration since electric light has been introduced, finds that plants do as well when placed in rooms illuminated by electricity as in the ordinary green-house. He says further that undoubtedly there is a more rapid growth of greenhouse flowers in the winter months, in clear moonlight than when there is no moonlight, thus showing the necessity for light, no matter from what source obtained. An excellent practical test of the genial effect of electric light on plants and flowers was afforded by the three days' exhibition held on Fifth Avenue this week. To all appearance the growth remained as fresh as if in a conservatory. Had the rooms been lighted by gas both plants and flowers would have been damaged in twenty-four hours.

An important suggestion in relation to the usefulness of electric light in greenhouses is that the Agricultural Department at Washington make the necessary experiments; for the vast interest involved in horticulture make it worth while to decide the question by careful comparative tests, such as the Agricultural Department can carry out.

—— The United States Company has been doing a rushing business thus far in the new year, having secured the contracts for the following Chicago business: Home Insurance Building, 2,000 incandescent lights; Royal Insurance, 1,300 incandescent lights; Insurance Exchange, 500 incandescent lights; Wallace Building, 300 incandescent lights. They have contracted with the U. S. Custom House people, Cincinnati, to have 1,000 sixteen candle-power and 100 one hundred and twenty-five candle-power lights, in working order, by June 1. At Jackson, Mich., they put in a plant for the Smith Middlings Purifying Company of 250 lights; Cedar Rapids, Ia., a plant for T. M. Sinclair; at Joliet, Ill., 30 lights for Lambert & Bishop; at Windsor, Ont., 50 arc light plant; at Rock Island, Ill, for the Merchants' Electric Light Co., 40 lights; and at Greer's cotton mill, Summerdale, Ill., 15 arc lights. At the St. Louis U. S. Custom House they have just completed a plan of 700 incandescent and 30 arc lights, and in the Chicago Custom House 750 incandescent lights have been accepted and paid for. One of their most interesting plants is at the Montezuma Hotel, Las Vegas Hot Springs, where there are 1,000 incandescent lights, fed through a subterranean wire extending down the cliff to the dynamo—a distance of 1,300 feet. This is a clear case of fluid—electric—running up-hill.

—— Sig. Meardi has proposed a system for the house-to-house distribution of current, which depends on the following principles: 1. Distribution in series of the conductors to the appliances utilizing the current, whether lamps, motors, accumulators, or electro-plating batteries. 2. Subdivision of the intensity of the current among the line conductors in different proportions, the conductors being therefore composed of various materials, but of small section, insulated and completely independent of each other. 3. Differential systems of counter-tensions and variable auxiliary resistances, with automatic regulators that may be worked by hand on receiving an oral signal from the tension indicator attached. 4. Utilization of the series at will, with slow and progressive graduation of the resistances, when the series is put in and out of circuit.—*London Electrician.*

—— In England local authorities have the option of purchasing the works and plant of electric lighting companies at the end of 21 years, or at any subsequent period of seven years. This, say the promoters, is fatal to enterprise, and they are now agitating for the repeal of the law.

ELECTRIC LIGHT NEWS

—— McVickers' Theater, Chicago, is to be thoroughly overhauled, and 1,000 Edison incandescent lights put in.

—— Janesville, Wis, is now lighted by the Thomson-Houston system, and the reports from there are excellent.

—— In Paris an electric lamp, fed with a portable accumulator, has been selected and rendered obligatory for use in seeking leaks in gas pipes. It is probable that many disastrous explosions will be thus avoided.

—— Mr. J. H. Reid, of the Electrical Supply Company, Chicago, and Mr W. A. Hammett, of the New York Safety Steam Power Company, are taking in the electric lights and other sights at New Orleans.

—— The Van Depoele Co. has contracted for a 60 arc light plant in Flint, Michigan, and the same number of lights for Fort Smith, Ark. They are placing, also, a plant of 30 incandescent and seven arc lights in Detroit, Michigan.

—— The Badger Electric Company has increased its Clark Street plant, in Chicago, from 100 to 300 lights, making the third increase. This plant embraces about one mile by one-half mile, and is all underground, the system being the Chicago Sectional Electric Underground Conduit Company. The Brush light is used. This company has just completed a plant of 100 Thomson-Houston lights in Racine, Wis. W. T. Lewis is president of the local company. The Badger Company is also operating a plant of 50 lights at Joliet, Ill., and are now installing a 60-light plant in Keokuk, Iowa.

—— At the meeting of the Board of Directors of the Chicago Electric Light Association, held March 6, the following officers were elected to serve one year: President, A. K. Stiles; vice-president, E. A. Sperry; secretary, J. H. Reid; treasurer, W. A. Hammett. This association is organized for the benefit and protection of the electric lighting interests of Chicago, and is to embrace in its membership all engaged in the business in that city. The annual dues of each member amount to $5, and the affairs of the association are to be conducted by a Board of Managers, which will meet once every month.

The other electric light companies, with headquarters in Chicago, quite generally report good business, with fine outlook. Mention at more length will be given hereafter.

—— The police authorities of Hartford say the electric lights have greatly lessened their labor, by greatly dimishing the commission of crimes and offences. It is chiefly after the hours of midnight that the wrong-doers are busy, provided their deeds can be done in darkness, but, so long as the electric lights are kept up nearly all night, they are a great hindrance to the commission of crime. The nocturnal misdeeds on Bushnell Park, for a single example, have diminished fully 90 per cent. since the Park was electrically lighted. Prowlers about the lighted parts of the city also find it more difficult to perpetrate mischief than formerly. The electric lights at once make the city, during the night, more attractive and safe.

—— At the meeting, on 31st January, of the Anciens Eleves des Arts et Metiers, in the Rue Vivienne, Paris, the hall was lighted by three incandescent lamps—two Swan and the other Gerard. Each of the Swan lamps received the current of ten No. 2 bichromate elements; and the Gerard was maintained by two batteries of 25 cells, No. 2 type, connected in multiple arc and filled with bichromate of potash, yielding a luminous intensity of 50 candles. A No. 1 bisulphate of soda battery of four elements supplied the current to a tolephone line set up in the hall; and, though the circuit remained closed for four hours, communication is said to have been as distinct at the end as at the commencement of the meeting.

Business Notice.

A. L. Bogart, Electrician, No. 22 Union Square New York, manufacturer and sole owner of Letters Patent and licenses controlling every variety of electric gas lighting apparatus for churches, theaters, public and private buildings, having by long experience and persistent effort acquired the best known system of constructing as well as of applying the varied apparatus used in the lighting of gas jets by electricity, has secured for them an admission of superiority, and an almost unlimited demand, resulting in the employment of improved machinery, tools and skilled workmen, and the production of a vast variety of apparatus, both faultlessly and economically made.

The trade procure almost every article required in the electric line from Mr. Bogart at less than the same would cost to manufacture in limited quantities. Prices are based on a living profit only, above actual cost. Royalties on patent rights are not considered.

The attention of the trade and of consumers is respectfully called to the subjoined list of patents issued or assigned to or controlled exclusively by A. L. Bogart. The validity of the patents marked thus (*) has been confirmed by decrees of Judge Addison Brown, of the U. S. Circuit Court for the Southern District of New York, December 25, 1884:

LIST OF THE BOGART PATENTS.

Multiple Gas-Lighting Apparatus.

No. 93,563 Aug. 10, 1869, H. J. Smith, Frictional Machine.

No. 119,561 Oct. 3, 1871, A. L. Bogart, Glass or Porcelain Insulation in a Gas-Burner.

No. 194,328 Aug. 21, 1877, A. L. Bogart, Lava as an Insulator in a Burner.

No. 199,676 Jan. 29, 1878, A. Wright, Wire Electrode Carried by a Lava Tip.

Single-Hand Gas-Lighting Apparatus.

*No. 116,054 June 20, 1871, Heyl & Diehl, Combination of Cock, Movable and Fixed Electrodes in a Gas-Burner.

*No. 146,953 Jan. 27, 1874, A. T. Smith, Hand-Lighter operated by Stop-Cock.

No. 152,427 June 23, 1874, A. T. Smith, Vibrator Burner.

No. 177,459 May 6, 1876, A. L. Bogart, Cock Burner and Method of Insulation.

*No. 180,832 August 8, 1876, A. L. Bogart, Use of Pendant, Wire or Chain to operate spark-producing Electrode in a Hand Burner.

No. 180,833 August 8, 1876, A. L. Bogart, Cork-Burner.

No. 202,694 April 23, 1878, A. L. Bogart, Fixed Arm Burner.

No. 203,406 May 7, 1878, A. L. Bogart, Insulation of Fixed Electrode by Collar on Lava Tip.

No. 206,272 July 23, 1878, A. T. Smith, Pivoted Bar Electrode.

No. 209,016 Oct. 15, 1878, A. L. Bogart, Automatic Burner.

*No. 225,971 March 2, 1880, H. F. Packard, the Original Ratchet Pendant Burner.

No. 259,267 June 6, 1882, A. L. Bogart, Automatic Burner.

No. 279,634 June 19, 1883, A. L. Bogart, Automatic Circuit Cut-off.

No. 282,043 July 31, 1883, A. L. Bogart, Candle Pendant Burner.

No. 290,732 Dec. 25, 1883, A. L. Bogart, Automatic Circuit Cut-off.

No. 292,732 Feb. 5, 1884, A. L. Bogart, Automatic Circuit Cut-off.

No. 292,786 Feb. 5, 1884, A. L. Bogart, Automatic Gas-Lighting Attachment for Burglar Alarms.

No. 306,128 Oct. 4 1884, A. L. Bogart, Cock Burner.

*No. 7,249 Aug. 1, 1876, A. T. Smith, Reissue of No. 146,953.

Also for the States of New York, New Jersey and Pennsylvania.

No. 121,301 Nov. 28, 1871, J. P. Tirrell, Automatic Burner.

No. 121,302 Nov. 28, 1871, J. P. Tirrell, Automatic Burner.

No. 230,567 July 27, 1880, G. F. Pinkham, Hand-Lighter.

No. 230,589 July 27, 1880, J. P. Tirrell, Automatic Burner.

*No. 230,590 July 27, 1880, J. P. Tirrell, Automatic Burner.

All parties are hereby notified that infringers will be prosecuted for manufacturing, selling, or using any gas-lighting apparatus covered by the foregoing list of patents, not obtained of A. L. Bogart or of his authorized agents.

March 1, 1885. A. L. BOGART.

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ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING MARCH 10, 1885.

313,487 Electric Arc Lamp; Warren P. Freeman, New York, N. Y.

313,488 Dynamo-Electric Machine; Warren P. Freeman, New York, N. Y.

313,489 Commutator for Dynamo Electric Machines; Warren P. Freeman, New York, N. Y.

313,513 Fare Register; Charles A. Neuert, Boston, Mass.

313,523 Electric-Thermostat; Frederick H. Prentiss, Cambridge, and James A. Tilden, Hyde Park, assignors to the Automatic Fire Alarm Association, Boston, Mass.

313,546 Electro-Dynamic Motor; Frank J. Sprague, New York, N. Y.

313,561 Regulator for Dynamo Electric Machines; F. G. Waterhouse, Sacramento, Cal.

313,605 Electric Contact Breaker; George S. Maxwell, Louisville, Ky., assignor to the Cressey Meter Company, same place.

313,610 Messenger Signal and Fire Alarm Apparatus; James J. O'Neill, Boston, Mass.

313,614 Railway Alarm Mechanism; William M. Pease, Pittsburgh, Pa., assignor of one-half to Lenox Simpson, same place.

313,615 Amalgamating Zinc Plates or Bars for Voltaic Batteries; William S. Platt, Waterbury, Conn.

313,616 Clamp for Electrical Purposes; William S. Platt, Waterbury, Conn.

313,640 Automatic Shunt for Telephone Lines; Charles D. Wright and Charles A. Fisher, Petersburg, Ill., said Fisher assignor of part of his right to said Wright.

313,720 Automatic Electric Signal-Controlling Apparatus; Edwin R. Gill, Jr., Pleasant Hill, Mo., assignor of one-half to John T. Russell, William A. Symington, and James M. Chaney, all of same place.

313,726 Electric Jewelry; Alfred Haid, Rahway, N. J.

313,731 Telephonic Connection; James A. Harlan, Washington, D. C.

313,746 Apparatus for Utilizing the Current Force of Flowing Waters in Producing Electric Currents; Albon Mann, Brooklyn, N. Y., assignor to the River and Rail Electric Light Company, Ohio County, W. Va.

313,782 Electric Mouth and Throat Illuminator; Eli T. Starr, Philadelphia, Pa., assignor to the S. S. White Dental Manufacturing Company, same place.

313,783 Electric Illuminator for the Mouth, and Similar Purposes; Eli T. Starr, Philadelphia, Pa., assignor to the S. S. White Dental Manufacturing Company, same place.

313,784 Electric Signaling Apparatus; Jacob P. Tirrell, Boston, Mass.

313,786 Printing Telegraph; Henry Van Hoevenbergh, Elizabeth, N. J., assignor to the Baltimore & Ohio Telegraph Company, Baltimore, Md.

313,787 Means for Preventing False Signals Upon Reversals in Quadruplex Telegraphs; Henry Van Hoevenbergh, Elizabeth, N. J.

313,788 Apparatus for Operating Electric Bells; H. E. Waite and S. H. Bartlett, New York, N. Y., assignor to Charles F. Levermore, same place.

313,789 Apparatus for Operating Electric Bells; H. E. Waite and S. H. Bartlett, New York, N. Y., assignors to Charles F. Levermore, same place.

313,791 Automatic Chemical Telegraph; Cherrick Westbrook, Harrisburg, Pa.

313,792 Automatic Telegraphy; Cherrick Westbrook, Harrisburg, Pa.

313,828 Support for Telephonic Transmitters; Henry B. Lytle, Boston, Mass., and John A. McCoy, Baltimore, Md.

313,829 Office Connection for Telephone and Telegraph Central Offices; Henry B. Lytle, Boston, Mass., and John A. McCoy, Baltimore, Md.

313,841 Automatic Circuit Changer and Alarm; Wm. B. Vansize, Boston, and Thomas D. Lockwood, Malden, Mass.

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